

DRAFT  
Environmental Assessment  
for a  
Proposed Application of a Section 4(d) of the  
Endangered Species Act Limitation  
For Threatened Species of Salmon and Steelhead  
Associated with the Five Counties Salmonid Conservation Program's  
"A Water Quality and Stream Habitat Protection Manual  
for County Road Maintenance in Northwestern California Watersheds"

Prepared for  
NOAA-National Marine Fisheries Service, Southwest Region

September 8, 2005

Prepared by  
Sari Sommarstrom, Ph.D.  
Sari Sommarstrom & Associates  
Etna, California

## SUMMARY

This document analyzes the effects of extending the Limit 10 routine road maintenance category to 4 ESUs with threatened salmonid species in the Northwestern California region of Del Norte, Humboldt, Mendocino, Siskiyou, and Trinity counties. These counties, under the Five Counties Salmonid Conservation Program, will soon be submitting their Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds to the Southwest Region of NMFS, seeking concurrence that the proposed road maintenance program meets the criteria set forth in the Limit 10 section 4(d) rule. The purpose of the Five Counties' Manual is to provide a user-friendly, fish-friendly guide for county road maintenance staff as part of each county's primary mission to provide a safe and open road system for the traveling public.

The Manual covers best management practices (BMPs) related to the routine and emergency repair and maintenance of county roads and related facilities. Road maintenance includes actions taken to prevent erosion and/or the deterioration of a roadway, such as the cutbank, road surface, fillslope and all drainage structures. Other related facilities are bridges and county road maintenance yards. The replacement of existing structures with different types of structures, such as replacing a culvert with a bridge, is included. The Manual also involves measures to protect the traveling public, such as snow and ice removal and emergency operations. Not addressed in the Manual is the construction, or a major expansion or change in use, of such roadways and facilities beyond those which existed previously.

This Environmental Assessment tiers on the previous EA evaluating the effects of implementing the Limit 10 category for routine road maintenance covering 14 ESUs, prepared in May 2002 (NMFS 2002). For Northwestern California, only the Central California Coast Steelhead ESU was included in the original 4(d) rule. The 2005 amendments to the 4(d) rule (effective August 29, 2005) apply revised take prohibitions and a modification of the 13 limits promulgated in 2000 to all threatened Pacific salmonids (NMFS 2005). This EA addresses those ESUs with threatened salmonid listings under the Endangered Species Act that are located within the five county region: Southern Oregon-Northern California Coasts Coho, California Coastal Chinook Salmon, Northern California Steelhead, and Central California Coast Steelhead.

The following alternatives are discussed and evaluated in detail in this EA:

Alternative 1 - No Action: Do not implement the 4(d) rule or its limits for the four threatened salmonid ESUs in northwestern California. As a result, NMFS would continue to require consultation under section 7 of the ESA for all routine county road maintenance projects that use Federal funds or apply for a Federal permit. Alternative 1 is the physical and biological status quo, and presents the environmental and social baseline upon which to measure the effects of taking any action.

Alternative 2 - Take Prohibitions with Limits (Proposed Action): Implement the ESA Section 9 take prohibitions for the four ESUs with a limit on their application for routine county road maintenance projects that meet the Limit 10 criteria defined in the 4(d) rule. Specifically, Alternative 2 is the submittal of the Five Counties Road Maintenance Manual

for approval by NMFS under Limit 10 of the 4(d) rule (NMFS 2002). If the agency determines that the Manual meets the criteria stated in Limit 10 for the conservation of listed fish, then the take prohibitions under section 9(a)(1)(B) and 9(a)(1)(C) of the ESA would not apply.

Implementation of the preferred alternative #2 would be expected to result in the following environmental, social, and economic effects:

- No change for most natural resource conditions.
- Potential for environmental improvements to watersheds due to Manual's emphasis on reducing road-related impacts, such as disconnecting roads hydrologically and preventing erosion.
- Improved salmonid access to streams due to priority implementation of fish passage inventories at county road crossings.
- Potential for some increase in local costs to implement some maintenance practices, though also potential for public grant funding to assist in implementation.
- No negative effects socially and economically in the region, with potential for some benefits due to road-related jobs and improved stream and fisheries conditions.

Based on the analysis in the draft EA and the comments received, a decision will be made by NMFS whether an environmental impact statement is required under section 102 (2)(c) of the National Environmental Policy Act.

## LIST OF PREPARERS

### Contractor

Sari Sommarstrom, Ph.D. -- Sari Sommarstrom & Associates

### NOAA-National Marine Fisheries Service

Greg Bryant -- Natural Resource Management Specialist/Area Recovery Coordinator

Scott Hill – Acting Assistant Regional Administrator for Protected Resources

Tony Morton – Environmental Protection Specialist/Regional NEPA Coordinator

Tim Price -- Fishery Administrator

Don Flickinger – Natural Resources Management Specialist

## Table of Contents

<b><u>SUMMARY</u></b>	<b>i</b>
<b><u>LIST OF PREPARERS</u></b>	<b>iii</b>
<b><u>1.0 INTRODUCTION</u></b>	<b>1</b>
1.1 Background	1
1.1.1 Application of the Section 4(d) Rules	3
1.1.2 Application of the Limit 10 Category	3
1.2 Purpose of Routine Road Maintenance Activities	4
1.2.1 Purpose of the Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds	4
1.2.2 Comparison of ODOT's and Five Counties' Manuals	5
1.3 Programmatic EA Review	6
<b><u>2.0 PURPOSE AND NEED</u></b>	<b>7</b>
2.1 The Proposed Action	7
2.2 Purpose and Need	7
2.3 Scoping	8
2.4 Ongoing Actions	8
<b><u>3.0 PROPOSED ACTION AND ALTERNATIVES</u></b>	<b>9</b>
3.1 Introduction	9
3.2 Alternative 1 – No Action	9
3.3 Alternative 2 – Proposed Action	9
3.4 Alternatives Considered but Eliminated from Detailed Study	10
3.5 Summary Comparison of Environmental Impacts	10
<b><u>4.0 AFFECTED ENVIRONMENT</u></b>	<b>11</b>
4.1 Introduction	11
4.1.1 Environmental Setting	11
4.2 Land Use Categories	12
4.2.1 Agriculture	12
4.2.2 Timber Harvest	13
4.2.3 Parks and Recreation	14
4.2.4 Urban Uses	15
4.3 Geology and Physiography	16
4.3.1 Coast Ranges	16
4.3.2 Klamath Mountains	16
4.3.3 Cascade Range	17
4.4 Soils	17
4.5 Climate	17
4.6 Air Quality	18
4.7 Water Quantity	19
4.8 Water Quality	21
4.8.1 Water Quality Regulations	21
4.8.2 Roadways and Water Quality	23
4.8.3 Water Temperature	25
4.8.4 Sediment and Turbidity	25
4.8.5 Dissolved Oxygen	26
4.8.6 Other Water Quality Issues	26

<u>4.9</u>	<u>Fish and Wildlife</u>	26
<u>4.9.1</u>	<u>Fish</u>	26
<u>4.9.1.1</u>	<u>Native Fish Species</u>	26
<u>4.9.1.2</u>	<u>Invasive Fish Species</u>	27
<u>4.9.1.3</u>	<u>Threatened and Endangered Fish Species</u>	28
<u>4.9.2</u>	<u>Wildlife</u>	29
<u>4.9.2.1</u>	<u>Threatened and Endangered Wildlife Species</u>	30
<u>4.9.2.2</u>	<u>Other Aquatic or Riparian Species of Concern</u>	30
<u>4.9.2.3</u>	<u>Marine Mammals</u>	31
<u>4.10</u>	<u>Vegetation</u>	32
<u>4.10.1</u>	<u>Threatened and Endangered Plant Species</u>	33
<u>4.11</u>	<u>Demography</u>	34
<u>4.12</u>	<u>Economy</u>	35
<u>4.12.1</u>	<u>General economic trends</u>	37
<u>4.12.2</u>	<u>Fishing (Commercial and Recreational)</u>	38
<u>4.13</u>	<u>Cultural Resources</u>	39
<u>4.14</u>	<u>Federal Tribal Trust Responsibilities, Tribal Rights and Interests</u>	39
<u>4.15</u>	<u>Environmental Justice</u>	41
<b><u>5.0</u></b>	<b><u>ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES</u></b>	<b>43</b>
<u>5.1</u>	<u>Introduction</u>	43
<u>5.2</u>	<u>Environmental Consequences</u>	46
<u>5.2.1</u>	<u>Land Use - Both Alternatives</u>	46
<u>5.2.2</u>	<u>Geology and Physiography - Both Alternatives</u>	47
<u>5.2.3</u>	<u>Soils</u>	47
<u>5.2.3.1</u>	<u>Alternative 1 - No Action</u>	47
<u>5.2.3.2</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	47
<u>5.2.4</u>	<u>Climate - Both Alternatives</u>	48
<u>5.2.5</u>	<u>Air Quality - Both Alternatives</u>	48
<u>5.2.6</u>	<u>Water Quantity</u>	48
<u>5.2.6.1</u>	<u>Alternative 1 - No Action</u>	48
<u>5.2.6.2</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	48
<u>5.2.7</u>	<u>Water Quality</u>	49
<u>5.2.7.1</u>	<u>Alternative 1 - No Action</u>	49
<u>5.2.7.2</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	49
<u>5.2.8</u>	<u>Fish and Wildlife</u>	49
<u>5.2.8.1</u>	<u>Salmonid ESUs</u>	49
<u>5.2.8.1.1</u>	<u>Alternative 1 - No Action</u>	50
<u>5.2.8.1.1</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	50
<u>5.2.8.2</u>	<u>Fish (not including the 4 Salmonid ESUs)</u>	50
<u>5.2.8.2.1</u>	<u>Alternative 1 - No Action</u>	50
<u>5.2.8.2.2</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	50
<u>5.2.8.3</u>	<u>Threatened and Endangered Fish Species</u>	50
<u>5.2.8.3.1</u>	<u>Alternative 1 - No Action</u>	51
<u>5.2.8.3.2</u>	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	51
<u>5.2.8.4</u>	<u>Birds, Land Mammals, and Herpetofauna</u>	51
<u>5.2.8.4.1</u>	<u>Alternative 1 - No Action</u>	51

5.2.8.4.2	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	51
5.2.8.5	<u>Threatened and Endangered Wildlife Species</u>	51
5.2.8.5.1	<u>Alternative 1 - No Action</u>	51
5.2.8.5.2	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	52
5.2.9	<u>Vegetation</u>	52
5.2.9.1	<u>Alternative 1 - No Action</u>	52
5.2.9.2	<u>Alternative 2 - Take Prohibitions with Limits (Proposed Action)</u>	52
5.2.10	<u>Demographic Trends - Both Alternatives</u>	52
5.2.11	<u>Economy - Both Alternatives</u>	53
5.2.12	<u>Tourism and Recreation - Both Alternatives</u>	53
5.2.13	<u>Cultural Resources - Both Alternatives</u>	53
5.2.14	<u>Federal Tribal Trust Responsibilities, Tribal Rights and Interests - Both Alternatives</u>	53
5.2.15	<u>Environmental Justice - Both Alternatives</u>	53
6.0	<b><u>CONSULTATION AND COORDINATION</u></b>	54
7.0	<b><u>BIBLIOGRAPHY</u></b>	56
8.0	<b><u>DISTRIBUTION LIST</u></b>	61
	<b><u>APPENDIX A</u></b>	63
	<b><u>APPENDIX B</u></b>	67

## 1.0 INTRODUCTION

### 1.1 Background

Several salmon species are in serious decline in the Pacific Coastal states. Many distinct populations (known as Evolutionarily Significant Units, or ESUs) of Pacific salmon or steelhead have been listed in recent years under the federal Endangered Species Act (ESA) as threatened or endangered. Coho salmon (also known as “silver” salmon), chinook salmon (also called “king” salmon), and steelhead (the ocean-migrating form of rainbow trout) are presently listed as threatened in all or parts of the five county region of Northwestern California. This region includes Del Norte, Humboldt, Mendocino, Siskiyou, and Trinity counties and encompasses 8 different ESUs for the three species, each with a different listing status under the ESA (Table 1-1).

Table 1-1. The Salmon and Steelhead ESUs included in the  
Five County Region, Northwestern California<sup>1</sup>

Species / ESU	Listing Status <sup>1</sup> & Date	ESU Area	Counties in NW Calif.
<b>COHO SALMON</b> <i>Oncorhynchus kisutch</i>			
<b>Southern Oregon / Northern California Coasts (SONCC)</b>	<b>Threatened</b> - Listed on 5/6/97 Critical Habitat - designated 5/5/99	Elk River, OR to Mattole River / Klamath & Trinity Basins	Del Norte / Humboldt / Mendocino / Trinity / Siskiyou
Central California Coast	Endangered - Listed on 3/31/96 Critical Habitat - designated 5/5/99	Punta Gorda to San Lorenzo River	Mendocino / Sonoma / others south
<b>CHINOOK SALMON</b> <i>Oncorhynchus tshawytscha</i>			
<b>California Coastal</b>	<b>Threatened</b> - Listed on 9/16/99	Redwood Creek through Russian River basin	Humboldt / Mendocino / Sonoma
Southern Oregon / Northern California	Listing not warranted	Cape Blanco south to lower Klamath R. downstream of Trinity River	Del Norte/ Humboldt/ Mendocino
Upper Klamath / Trinity	Listing not warranted	Klamath / Trinity basins, above confluence with Trinity River	Siskiyou / Trinity / Humboldt
<b>STEELHEAD</b> <i>Oncorhynchus mykiss</i>			
<b>Northern California</b>	<b>Threatened</b> - Listed on 6/7/00	Redwood Cr. through Gualala River	Mendocino/ Humboldt
<b>Central California Coast</b>	<b>Threatened</b> - Listed on 8/18/97 4(d) Rule (Limit 10) in 7/00	Russian R. thru Aptos Cr.	Mendocino (and others south)
Klamath Mountains Province	Listing not warranted	Cape Blanco, OR to South Fork Trinity Basin	Del Norte / Humboldt / Siskiyou / Trinity

1/ Species status updates can be found at NMFS website: <http://www.nwr.noaa.gov>

Several ESUs were deemed “not warranted” for listing at this time. The listing status of these and other ESUs of salmon and steelhead in the Pacific Coastal states was initially determined by NOAA-National Marine Fisheries Service (NMFS) between 1997 and 2000. In 2003, the West



Coast Salmon and Steelhead West Coast Salmon Biological Review Team conducted a series of reviews of the status of West Coast populations of Pacific salmon and steelhead (NMFS 2003c). The reviews were done in consideration of new data that accumulated since the last updates and to address issues raised in recent court cases regarding the ESA status of hatchery fish and resident (non-anadromous) populations. The reviews were a key first step in NMFS' efforts to update the listing determinations for all listed ESUs of salmon and steelhead, culminating in the proposed listing determinations for 16 ESUs of west coast salmon, and amendments to the existing 4(d) protective regulations for threatened salmonid ESUs (NMFS 2005).

NMFS is charged with the responsibility for implementing the provisions of the ESA for ocean species like salmon. As a result, the agency cannot allow the "take" of these listed species through even unintentional harmful actions, such as road-related stream sedimentation or culvert blockages to fish passage. Species listed as endangered have "take" prohibitions imposed under Section 9 of the ESA<sup>1</sup>. Take exceptions can be provided for threatened species under Section 4(d) (for federal or non-federal activities, with special rules for certain practices), Section 7 (for federally funded or permitted activities), and Section 10 (for non-federal activities) of the ESA.

Section 4(d) of the ESA authorizes the Secretary of Commerce, in cooperation with the affected states, to "issue such regulations as he deems necessary and advisable to provide for the conservation" of threatened species. In the Pacific Coastal region, NMFS promulgated a 4(d) rule for 14 of the threatened ESUs of salmon and steelhead in July 2000 (65 FR 42422). The rule was accompanied by a set of "limits" on the application of the ESA section 9 take prohibitions. These limits were only for specified categories of activities that were determined to contribute to conserving listed salmon and steelhead species. One of these 13 limit categories (Limit 10) pertains to routine road maintenance (RRM) programs. An Environmental Assessment (EA) of the effects of implementing the Limit 10 category for those 14 ESUs was prepared in May 2002 in accordance with the National Environmental Policy Act (NEPA) (NMFS 2002). For Northwestern California, only the Central California Coast Steelhead ESU was included in the original 4(d) rule. The 2005 amendments to the 4(d) rule (effective August 29, 2005) apply revised take prohibitions and a modification of the 13 limits promulgated in 2000 to all threatened Pacific salmonids (NMFS 2005).

This document builds on the 2002 EA and analyzes the effects of extending the Limit 10 routine road maintenance category to the additional 4 ESUs (noted in bold in Table 1) with threatened salmonid species in the Northwestern California region of Del Norte, Humboldt, Mendocino, Siskiyou, and Trinity counties. These five counties, under the Five Counties Salmonid Conservation Program, will soon be submitting their Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds to the Southwest Region of NMFS, seeking concurrence that the proposed road maintenance program meets the criteria set forth in the Limit 10 section 4(d) rule.

---

<sup>1</sup> "Take" is defined under section 9(a)(1) to mean, "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any wildlife species listed as endangered, without written authorization."

### 1.1.1 Application of the Section 4(d) Rules

The Northwest and Southwest regions of NMFS (aka “agency”) have both determined that the section 9 take prohibitions can be invoked with limited exceptions. Their 4(d) rule program allows entities to be assured that an activity they are conducting (or permitting) is consistent with ESA requirements and avoids or minimizes the risk of take of listed threatened salmon and steelhead (also called salmonids). The program must contribute to the conservation of listed salmonids and their habitat.

NMFS produced the 4(d) rule with a total of 13 limits for the 14 ESUs (which apply to an area of about 160,000 square miles) through a lengthy and thorough public process. The agency analyzed the effects on each ESU in a series of EAs under NEPA, including the Central California Coast Steelhead ESU (NMFS 2000). As mentioned above, it then followed with an EA for the Limit 10 routine road maintenance category for the 14 ESUs (NMFS 2002). In these EAs, the agency found that the rules would not have a significant effect on the human environment. This EA examines the possible effects of certifying that the Five Counties Salmonid Conservation Program’s Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds meets the requirements for approval under Limit 10.

### 1.1.2 Application of the Limit 10 Category

Under Limit 10, the effects on threatened salmonids of RRM activities conducted by a state, city, county or port can be excluded from the protective reach of Section 9 of the ESA. In order for Section 9 take prohibitions to not apply to RRM activities, NMFS must find that the activities meet the criteria enumerated at 50 C.F.R. 223.203(b)(10)(i)-(v).

In particular, the agency cites the Oregon Department of Transportation’s (ODOT) manual, “Routine Road Maintenance - Water Quality and Habitat Guide” (July 1999) as a model under Limit 10. NMFS indicated in its formal comments how this program “greatly improves” protections for listed fish that might be affected from a range of routine maintenance activities “by minimizing the activities’ impacts on streams”. As a result of the manual’s comprehensive content, the agency found it not necessary or advisable to apply the “take prohibitions” under the ESA to routine road maintenance activities conducted by employees or agents of ODOT or other entities if their program complies substantially with that contained in the ODOT guide or has been determined to meet or exceed the protections provided by the ODOT guide (NMFS 2000). This specific exception was provided for in the July 10, 2000 rule under the Act’s Section 4(d), which is one of the legal means for local government to obtain permission to continue actions which could possibly cause any unintentional take to a listed species. The agency encourages counties to follow the ODOT example: *“Any jurisdiction wanting its routine road maintenance activities to be within this exception to ESA’s take prohibition must first commit in writing to apply management practices that provide protection equivalent to or better than those provided by the ODOT guide.”*

In January 2002, the Washington State Department of Transportation (WSDOT), seven Washington counties and 17 Washington cities submitted to NMFS (Northwest Region) a joint

routine road maintenance program aimed at protecting salmon listed under the Endangered Species Act (Federal Register Jan. 25, 2002, pp. 3688-3689). The City of Portland's Office of Transportation submitted its Routine Road Maintenance Program in May 2003 under a Limit 10(i) (Federal Register May 5, 2003, pp. 23696-23697).

Written approval of a RRM program by NMFS is required to avoid possible liability under the ESA. To be approved by NMFS under Limit 10 criteria, a RRM program for an area must describe how RRM activities conserve salmon and meet their biological requirements. In particular, the program must contribute to attainment and maintenance of the properly functioning condition (PFC) of the habitat, which is defined by the agency as *"the sustained presence of natural habitat-forming processes that are necessary for the long-term survival of salmonids through the full range of environmental variation"* (50 CFR 223.203(b)(10)). Actions that affect salmonid habitat must:

- not impair properly functioning habitat,
- not appreciably reduce functioning of already impaired habitat, and
- not retard the long-term progress of impaired habitat toward PFC.

Approval by NMFS also requires that RRM practices meet the Limit 10 criteria described in the July 2000 4(d) rule. Assurance of adequate training, tracking, and reporting is required to determine whether the practices are protective enough of the threatened ESUs. NMFS biologists would make use of a tiering form (see example form in Appendix A) to monitor those components.

## 1.2 Purpose of Routine Road Maintenance Activities

Routine road maintenance activities are scheduled or predictable recurring activities that are needed to maintain the functioning integrity of the existing transportation facilities by increasing safety and mobility for customers (ODOT 1999). Best management practices to protect water and habitat are used to carry out such activities by road maintenance personnel. Construction of new facilities is not included.

### 1.2.1 Purpose of the Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds

The purpose of the Five Counties' Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds (aka "Manual") is to provide a user-friendly, fish-friendly guide for county road maintenance staff as part of each county's primary mission to provide a safe and open road system for the traveling public. The Manual is intended to also be part of an evolving, proactive process by the counties of the northwestern region of California – Del Norte, Humboldt, Mendocino, Siskiyou, and Trinity – to address their mutual needs as part of the Five Counties Salmonid Conservation Program.

The Manual covers best management practices (BMPs) related to the routine and emergency repair and maintenance of county roads and related facilities. Road maintenance includes actions taken to prevent erosion and/or the deterioration of a roadway, such as the cutbank, road surface, fillslope and all drainage structures. Other related facilities are bridges and county road

maintenance yards. The replacement of existing structures with different types of structures, such as replacing a culvert with a bridge, is included. The Manual also involves measures to protect the traveling public, such as snow and ice removal and emergency operations. Not addressed in the Manual is the construction, or a major expansion or change in use, of such roadways and facilities beyond those which existed previously. The time scale to accomplish road improvements, such as the replacement of ineffective or old culverts, is expected to be over a 50 year period.

The Five Counties Program worked closely with NMFS, the California Department of Fish and Game, and the North Coast Regional Water Quality Control Board to ensure that the Manual's practices were sufficiently protective of fish habitat and water quality. Existing road maintenance and erosion control manuals were reviewed for relevant policies and practices, including those produced by the Association of Bay Area Governments, California Department of Transportation, California Regional Water Quality Control Board, International Erosion Control Association, Oregon Department of Transportation, Pacific Watershed Associates, U.S. Forest Service, and Washington Department of Transportation.

### 1.2.2 Comparison of ODOT's and Five Counties' Manuals

Similar categories of maintenance practices can be found in the two manuals, since the Five Counties Manual was built upon the ODOT Manual (see Table 1-2). Not every category of the state transportation agency's practices was applicable to county road activities.

Table 1-2. Comparison of Categories in ODOT and Five Counties Manuals

<b>ODOT Manual – Management Maintenance System</b>	<b>Five Counties Manual – Chapter &amp; BMP sections</b>
Surface Work	3-B-1 Surface Work
Shoulder Blading	3-A-1 Shoulder Blading
Dust Abatement	3-B-2 Dust Abatement
Sweeping / Flushing	7-A-1 Bridge Cleaning & Maintenance
Ditch Shaping and Cleaning	3-A-2 Ditch Shaping & Cleaning
Culvert and Inlet Cleaning & Repair	4-A Culvert Cleaning 4-B Culvert Improvement & Repair 4-E Ditch Relief Culverts Appendix B-3 - Culverts
Erosion Repair	3-A-2 Erosion Control Appendix B-4 Erosion Control Appendix B-9 Sediment Control
Channel Maintenance	3-A-4 Channel Maintenance
Fish Restoration	3-A-2 Erosion control; 3-A-3 Ditch Shaping and Cleaning Appendix B-7 Streambank Protection
Fish Betterment	4-B Culvert Improvement & Repair 4-C Culvert Sizing 4-D Culvert Replacement 4-F Temporary Stream Diversions Appendix B-3 - Culverts Appendix B-5 – Fish Exclusion Appendix B-6 - Fish Ladders
Bridge Maintenance	7-A Bridge Maintenance

<b>ODOT Manual – Management Maintenance System</b>	<b>Five Counties Manual – Chapter &amp; BMP sections</b>
	7-B Repair & Drift Removal
Bridge Repair	7-A Bridge Maintenance 7-B Repair & Drift Removal
Vegetation Management	(see below)
Mowing & Brush Cutting	3-C-1 Mowing and Cutting
Spraying	Not applicable
Bridge Vegetation	7-A-2 Bridge Vegetation Management
Other Vegetation Management	3-C-2 Tree Removal
Accident Clean-Up	8-C Accident Clean-Up
Guardrail Replacement	Not addressed
Attenuator Maintenance	Not applicable
Snow and Ice Removal and Sanding	9-A Snow and Ice Removal 9-B De-Icing, Anti-Icing, and Sanding
Emergency Maintenance	8-A Emergency Maintenance - General
Settlements and Slides	8-B Slide and Settlement Repair
Extraordinary Maintenance	8-C Accident Clean-Up
Stockpiling	5-A Spoil Disposal 5-B Stockpiling for Reuse
(not addressed)	6 - Managing the Maintenance Yard
(addressed elsewhere)	10 – Monitoring the Practices
(addressed elsewhere)	11 - Training the Staff
(not addressed)	12 – Information Sources

### 1.3 Programmatic EA Review

NMFS is using a staged or sequential approach to its NEPA process for implementation of the 4(d) rule Limit 10 and any RRM programs submitted under the limit. The first stage was the May 2002 Programmatic Environmental Assessment of ESA Section 4(d) Limit 10. It did not address the potential effects of individual RRM programs, like that of the Five Counties Salmonid Conservation Program's Manual.

This EA will present a summary of the issues addressed in the programmatic Limit 10 EA and will incorporate by reference, where applicable, the analyses it presented. New issues and possible effects related to the Manual will also be addressed.

## 2.0 PURPOSE AND NEED

### 2.1 The Proposed Action

NMFS proposes to implement Limit 10 of the July 10, 2000 ESA section 4(d) rules for a specific RRM program in northern California. This action implements an additional management tool for the conservation of the four ESUs of threatened salmonids located within the five counties (subsection 3.3, Alternative 2 - Proposed Action).

### 2.2 Purpose and Need

The **Five Counties Salmonid Conservation Program (5 C)** desires to submit to the Southwest Region of NMFS the Program's Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds. The 5 C will seek concurrence that the Manual meets the limitation criteria set forth in 50 C.F.R. 223.203(b)(10)(i)-(v), as modified by 70 Fed. Reg. 37160 (June 28, 2005), which were promulgated pursuant to Section 4(d) of the Endangered Species Act (ESA). As part of this process, this Environmental Assessment (EA) is prepared, as required under the National Environmental Policy Act (NEPA), to consider the consequences of applying an ESA Section 4(d) limitation to the Manual. The Manual can be found on the 5 C website: [www.5counties.org](http://www.5counties.org).

The environmental review and EA will enable NMFS officials to determine whether there are likely to be significant environmental impacts associated with the proposed action and any alternatives. This EA will be used by NMFS as the basis for either a finding of no significant impact (FONSI) or for the preparation of an environmental impact statement (EIS).

Section 4(d) of the ESA authorizes the Secretary of Commerce, in cooperation with affected states, to issue regulations to provide for the conservation of threatened species and to establish conditions allowing exceptions (or limits) to such take restrictions. In 2000, NMFS completed a process of rulemaking establishing 13 such "limits" for threatened species of salmon and steelhead in the Northwest and California.

In 2002, NMFS added nine additional limits addressing four salmonid ESUs in California: the Central Valley Spring-run Chinook, California Coastal chinook, Central California Coast Coho, and Northern California *O. mykiss* ESUs. These limits are essentially identical to limits previously promulgated in 2000 and similarly address routine road maintenance activities. Rather than including the four California ESUs under the limits promulgated in 2000, NMFS treated these ESUs under separate limits to ensure that they received timely and appropriate protections under the ESA. A Programmatic EA was completed in 2002 for Limit 10, which applies to road maintenance activities that have the potential to affect 14 salmon and steelhead evolutionary significant units (ESUs) within the Northwest and Southwest Regions of NMFS. Additional NEPA compliance was expected to be provided for subsequent specific Limit 10 submittals within the two regions.

In late 2004, a draft EA was issued by NMFS, assessing the environmental consequences of amending the 4(d) protective regulations for all 23 ESUs that were proposed for listing as threatened (NMFS 2004).

The ESUs to be assessed in this EA, with geographic areas by rivers north to south, are:

- 1) Southern Oregon/Northern California Coasts Coho: Winchuck River-Mattole River;
- 2) Northern California Coast Steelhead: Redwood Creek (Humboldt)-Gualala River;
- 3) California Coast Chinook: Redwood Creek (Humboldt)-Russian River;
- 4) Central California Coast Steelhead: Russian River-Aptos Creek (this is the actual ESU boundary, but the actual area for Mendocino County would be just the Russian River basin within county boundaries).

## 2.3 Scoping

An announcement of this Environmental Assessment process was sent by e-mail in April 2004 to various local, state, federal, and tribal agencies and interested parties. This initial notification list can be found in section 6. No new issues were identified as a result of that notification.

## 2.4 Ongoing Actions

Ongoing actions that may affect or be affected by the proposal include daily and routine road maintenance operations of the road departments within the five counties of Del Norte, Humboldt, Mendocino, Siskiyou, and Trinity.

Other road-related actions that are ongoing in the region include:

- California Fish Passage Forum  
This forum is a collaboration among public and private sectors on fish passage restoration programs and activities. It uses a Memorandum of Understanding (MOU) for a coordinated approach to restoring fish passage for anadromous salmonids in coastal watersheds through the Forum.
- Fish Net 4C  
Similar to the Five Counties Salmonid Conservation Program (5C), this regional effort extends from the Russian River Basin in Mendocino County to San Luis Obispo County and encompasses the portions of the ESUs to the south of the 5C region and the 4 ESUs of this analysis. County road maintenance issues and RRM Manual are also a focus.

### 3.0 PROPOSED ACTION AND ALTERNATIVES

#### 3.1 Introduction

This EA and the Programmatic EA of May 2002 conducted internal and external scoping to identify issues. A summary of the combined concerns related to the 4(d) rule and the limits is as follows:

1. Conserve listed salmonids and the habitats upon which they depend.
2. Follow mandates of the ESA.
3. Allow people to participate more fully in species conservation and thereby encourage voluntary compliance.
4. Streamline the process for making determinations on RRM programs under the ESA.
5. Develop fertile partnerships with states and local citizens to ensure that future resource activities go forward in a fish-friendly, innovative, and cooperative manner.

#### 3.2 Alternative 1 – No Action

The No Action alternative represents “the future without the Federal action.” It evaluates the possible results of not implementing the 4(d) rule or its limits for the four threatened salmon and steelhead ESUs in northwestern California. This alternative is the physical and biological status quo, and presents the environmental and social baseline upon which to measure the effects of taking any action.

Under Alternative 1, existing section 9 “no take” prohibitions would be in effect and therefore, no exceptions or “limits” would exist on those prohibitions. State, local, private and tribal actions could only be implemented if there were no take of threatened species.

NMFS would not have the management options, unless a section 7 requirement exists, needed to become involved in ongoing cooperative conservation efforts established under local and state resource protection regulations, or to encourage other planning efforts with state, local and tribal entities. Interaction with those entities would be limited to activities undertaken by NMFS in accordance with enforcement of the no take provisions of section 9.

Alternative 1 would not facilitate cooperation between NMFS and the five counties with regard to development and implementation of a road maintenance program that is both practicable and fish-friendly. Instead, the counties would continually be subject to the no take provisions of section 9 of the ESA and NMFS would be responsible for continually enforcing those provisions. This No Action scenario also offers a useful baseline for analyzing the effects of the two alternatives.

#### 3.3 Alternative 2 – Proposed Action

The Proposed Action responds to the issues identified during the NEPA scoping processes. Alternative 2 implements the ESA section 9 take prohibitions with a limit on their application for



the RRM programs that meet the Limit 10 criteria defined in the 4(d) rule. Specifically, the Proposed Action is the approval by NMFS of the Five Counties RRM Manual under Limit 10 of the 4(d) rule. If the agency determines that the program meets the criteria stated in Limit 10 for the conservation of listed fish, then the take prohibitions found under section 9(a)(1) (B) and 9(a)(1)(C) of the ESA would not apply to activities carried out under the RRM.

To receive the agency's approval, the RRM program must meet one of the following criteria:

1. ODOT equivalent or better RRM plans (10)(i) (see ODOT 1999); or
2. RRM Plans meeting Properly Functioning Conditions (10)(ii) (see 50 CFR 223.203(b)(10)(ii)).

NMFS would first publish notification in the Federal Register to announce the availability of the program for public review and comment (for a period of not less than 30 days). The agency would also need to periodically ensure that the approved RRM program is effective in maintaining and achieving habitat function for the conservation of the listed salmonids. If needed, the agency would identify to the jurisdictions ways in which the program needs to be altered or strengthened. Such changes may be warranted if the program is not protecting desired habitat functions or the habitat is not supporting population productivity levels needed to conserve the ESU. The jurisdictions within the limit must make changes to respond adequately to the new information in the "shortest amount of time feasible, but not longer than one year" (NMFS 2002). If that action does not happen, the agency would publish notification in the Federal Register of its intention to withdraw the limit so that take prohibitions would again apply to the jurisdictions and their RRM program. After a comment period of not less than 30 days, NMFS would make a final determination whether to subject the RRM activities to the ESA section 9(a)(1) prohibitions.

Alternative 2 provides an option to authorities other than the ESA section 7 and section 10 tools to conserve listed ESUs. It also fosters cooperative management relationships with the pertinent counties, as encouraged in the NOAA Strategic Plan (NOAA 1997).

### 3.4 Alternatives Considered but Eliminated from Detailed Study

The programmatic EA considered three alternatives: 1) No action; 2) Proposed action; 3) Take prohibitions (under section 9). The latter alternative would mean that a RRM program affecting listed salmon and steelhead may require consultation with NMFS under section 7, or an incidental take permit under section 10 (which also requires consultation). NMFS and the counties would not realize the management efficiencies offered by a section 4(d) limit in addressing the concerns listed above. This alternative was therefore eliminated from detailed study in this EA.

### 3.5 Summary Comparison of Environmental Impacts

This summary is provided in Chapter 5 and in Table 5-1.

## 4.0 AFFECTED ENVIRONMENT

### 4.1 Introduction



This chapter describes current conditions of the resources that may be affected by implementing the proposed action or its alternatives. The “affected environment” is defined as that portion of the physical, biological, and social environment that may be affected by implementation of the alternatives. The proposed action addresses five threatened salmonid ESUs. Any effects of the proposed action would occur within the ESU ranges, although some secondary effects may occur outside of these ranges. The analysis area consists of 17,555 square miles in northwestern California, including upland, freshwater, estuarine, and near-shore marine areas. The near-shore marine area extends 3 miles west of the coastline from the California-Oregon border to the Mendocino-Sonoma County line near Gualala.

#### 4.1.1 Environmental Setting



The North Coast region of California, for the purposes of this analysis, is depicted in Figure 4-1. It extends from the Smith River and Klamath River, which originates to the northeast in Oregon, to the Russian River basin north of San Francisco. Most of this region is within the Pacific Border physiographic province, while the middle and upper Klamath extend into the Cascade-Sierra Mountains province (as defined in Figure 2, NMFS 2002).

Forested mountains dominate much of the landscape. Redwoods are found along the coast, while mixed conifer forests prevail inland. Foothill rangeland encompasses oak woodland, mixed chaparral, and annual grassland habitats. Crops are raised on farmland in river valleys interspersed throughout the region. Many rivers and streams intersect the terrain, and watershed boundaries are often visually discernable.

*Figure 4-1. Northwestern California Region*

The population density of the five-county region is quite low compared to the rest of California. As shown in Table 4-1, the density ranges from 4.1 persons per square mile in Trinity County to

35.4 in Humboldt County. In contrast, the state's density is 217 persons per square mile. The largest urban areas include: Eureka, Arcata, Ukiah, Fort Bragg, Crescent City, Weaverville, and Yreka.

Table 4-1. Geographic Facts about Five County Region, Northwestern California.

County	Land Area (sq. mi.)	Population Density – 2000 (persons per square mile)
Del Norte	1,008	27.3
Humboldt	3,572	35.4
Mendocino	3,509	24.6
Siskiyou	6,287	7.1
Trinity	3,179	4.1
Total or Average	17,555	16.95

## 4.2 Land Use Categories

Almost half of the forest and range lands in the region are publicly owned, primarily by the USDA Forest Service but also by the Bureau of Land Management (BLM), National Park Service, California State Parks, State Forest, and local parks and facilities (Table 4-2). Land uses on public lands include outdoor recreation, camping, grazing, timber harvesting, fishing, wilderness preservation, and mining. Private forest lands are represented by industrial (such as the forest products industry) and non-industrial ownerships of various sizes. Tribal lands also exist; they are held in federal trust but are not public lands (see Table 4-23).

Table 4-2. Area of forests and rangelands by major ownership for Klamath / North Coast Bioregion\* (CDF 2003):

Ownership	Acreage	Percentage
Private	6,997,000	51.1 %
Public	6,684,000	48.9 %
US Forest Service	5,613,000	41.0 %
Bureau of Land Management	583,000	4.3 %
National Park Service	117,000	0.9 %
Other Public	371,000	2.7 %
Total	13,681,000	100.0 %

\* Bioregion includes more than the five county region; also includes Lake & Shasta counties.

Agricultural uses include farming, ranching, and nursery production. In addition to the above rural land uses, urban lands are used for residential, commercial and industrial uses. In California, each county and city has jurisdiction over allowable uses of private land. Each has adopted, as relevant, a General Plan, a Local Coastal Plan, and implementing ordinances (such as zoning, floodplain, etc.) to determine and regulate appropriate land uses.

### 4.2.1 Agriculture

In the Klamath/North Coast region, most of the land is forest and range land. Irrigated agriculture can be found primarily in valleys and coastal plains: Russian River Valley, Anderson Valley, Round Valley, Eel River Delta /Ferndale, lower Smith River, Hayfork Valley, Scott Valley, Shasta Valley, Butte Valley, and Tule Lake area. Farms represent about 30% of the area of Humboldt and Mendocino counties (see Table 4-3). Major crops are pasture, grain, alfalfa,

wine grapes, pears and apples, truck crops, and nursery stock. Livestock production, mainly of beef cattle on range and pasture lands, plays a significant role in Humboldt and Siskiyou counties. Humboldt County is home to many dairies in the Ferndale area, while Mendocino County is well known for its wine grapes.

Table 4-3. Agricultural Statistics for the Five County Region, 2002 (USDA 2004)

	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>
# farms (1997)	66	792	1,092	733	116
Acres in farms	13,356	633,931	707,466	610,388	105,469
% of County	2.1%	27.7%	31.5%	15.2%	5.2%
Cattle & calves (#)	9,875	63,106	20,024	64,689	4,935
Grapes (acres)	--	137	17,771	35	--
Orchards (acres)	--	391	21,203	33	41
Hay /alfalfa (acres)	800	9,642	7,514	87,233	467

About 2/3 of primary rangelands (e.g., lands suitable for grazing) is in private ownership, with the balance mainly managed by the U.S. Forest Service or the Bureau of Land Management (CDF 2003). Some agricultural land conversion is occurring in the region depending on the demand: farm and range land to rural residential, conifer and hardwood forestland to vineyards.

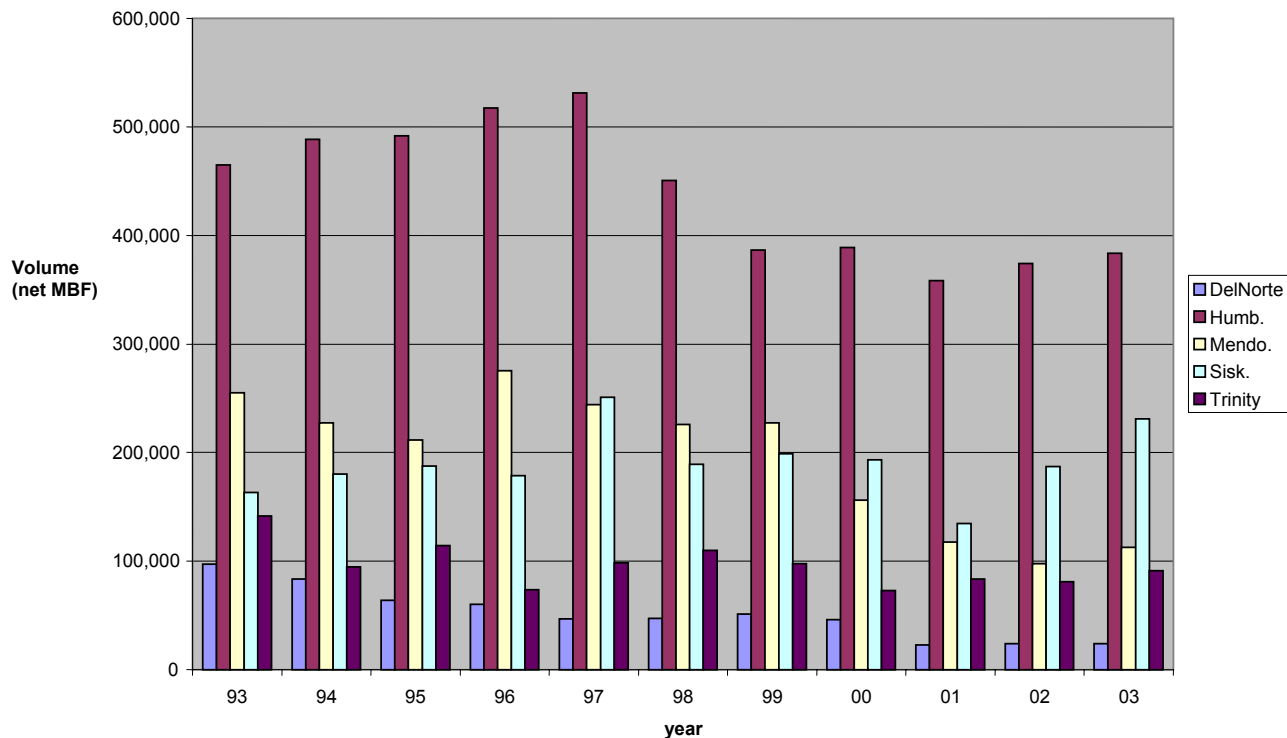
#### 4.2.2 Timber Harvest

Timber harvesting is a major use of forestlands in the North Coast counties (CDF 2003). Statistics from the past decade for public and private ownerships are shown in the following graph (Figure 4-2). The average annual timber harvest for the region has declined from 224,315 million board feet (net MBF) in 1993 to 168,373 MBF in 2003 (Calif. Board of Equalization 2004). Humboldt and Siskiyou counties produced the highest volume of timber of all California counties in 2003, with the five county region representing half of the state's timber volume.

Timber harvest on public land, particularly on national forests, has declined significantly since the peak in 1988-89. Much of this decline was due to changed federal timber policies to increase protection of species and ecosystems. Harvesting is presently concentrated on forest industry lands zoned for timber production (TPZ) in the Klamath / North Coast region. Private non-TPZ lands also produce some timber, though "dedication to timber production is uncertain" (CDF 2003). The trend towards overall reduced harvesting and less harvesting of old growth suggests that "land management impacts due to logging will continue to decrease in the future," according to the California Forest and Range 2003 Assessment.

Non-federal timberlands are regulated under the Forest Practice Rules of the California Board of Forestry and Fire Protection (CDF 2003). In addition to addressing silvicultural systems, these rules also seek to mitigate potential environmental impacts of timber harvest operations. Requirements to protect fish habitat include higher levels of forest canopy along stream courses, road erosion treatments, steep slope restrictions, and providing adequate flood and fish passage through culverts. Public land managers apply similar or stricter best management practices (BMPs) to protect stream habitats from harvesting effects, or they curtail logging completely, to comply with federal rules.

**Figure 4-2. Timber Harvest in North Coast, 1993-2003**



#### 4.2.3 Parks and Recreation

Recreational use includes camping, hiking, fishing, hunting, boating, and swimming. California's North Coast region is home to several units of the national park system as well as quite a few State and local parks & beaches (Kreissman 1991). The National Park Service manages Redwood National Park, Lava Beds National Monument, and Whiskeytown-Shasta-Trinity National Recreation Area. Additionally, BLM is the managing agency for the King Range National Conservation Area, located on the "Lost Coast" area of Humboldt County. Recreation is a major use on the large national forests: Klamath, Mendocino, Shasta-Trinity, Six Rivers and small portions of the Siskiyou and Rogue River. Primitive recreation can be experienced in areas designated as Wilderness on federal and state lands.

State parks and beaches are most common along the coast. The three coastal counties contain about 20 state parks with developed campsites within the redwoods. However, the majority of developed campsites are found under private management (see Table 4-4).

Mendocino County has at least four underwater parks, managed by the California Department of Parks and Recreation, to provide recreational opportunities for viewing, photography, spear fishing, shell fishing, and diving. State Parks also operates a natural preserve and about six reserves in the coastal area for the purpose of protecting natural features while providing compatible public enjoyment and education (Kreissman 1991).

Table 4-4. Campsite Inventory for Klamath / North Coast Bioregion,  
1999-2000 (CDF 2003)

Category	Campsites
Private	12,822
City – County	730
Calif. State Parks	2,360
US Forest Service	652
National Park Service	133
Other Federal	484
Utilities	15
Total	17,196

#### 4.2.4 Urban Uses

Between 1940 and 2000, the developed “urban” area of the Klamath / North Coast bioregion (also includes Lake and Shasta counties) increased by about 248,000 acres, or 3% of the region (CDF 2003). However, the region remains much more rural than urban. There are no “metropolitan areas” designated by the U.S. Census Bureau in Siskiyou and Trinity counties.

Urban land uses include industrial, commercial, residential, and public facilities. Included in public facilities are publicly maintained roadways, such as interstate highways, state highways, and county and city roads. Table 4-5 lists the road infrastructure by county. Note that 2/3 of the counties’ roads are surfaced and 1/3 unsurfaced, typical of rural road systems.

Table 4-5. Road Infrastructure & Number Vehicles in Five County Region, 2000

	Del Norte	Humboldt	Mendocino	Siskiyou	Trinity	Total
Miles of street, roads, highways <sup>1</sup>	412.5	1,813.5	1,502.1	1,894.3	900.5	6,522.9
Total County Road Miles <sup>2</sup>	501	1207	1018	1364	700	4,790
(Surfaced)	(302)	(907)	(706)	(808)	(455)	(3,178)
(Unsurfaced)	(199)	(300)	(312)	(556)	(245)	(1,612)
# vehicle registrations <sup>1</sup>	23,499	128,392	97,148	56,745	17,707	323,491

Sources: 1/ Calif. Dept. of Finance - [www.dof.ca.gov](http://www.dof.ca.gov) ; 2/ Five Counties, 2002

Road-related public facilities also include county and city road maintenance yards. Various activities occur at these sites, such as outdoor and indoor material storage, vehicle fueling, and vehicle and equipment repair and washing. Urban sites are usually connected to sanitary sewer systems.

Major urban public facilities also include harbors and ports. Coastal ports in the region are located in Crescent City, Trinidad, Eureka / Humboldt Bay, and Fort Bragg. Commercial industrial shipping occurs primarily at Humboldt Bay harbor, with commercial and recreational

fishing and boating dominating the uses of the other ports. Activities at ports include boat repair and storage, dredging and filling for channel maintenance, and related access.

### 4.3 Geology and Physiography

Ranging from sea level to the heights of volcanic Mt. Shasta (14,162 ft.), the North Coast region of California encompasses portions of three geomorphic provinces: the Coast Ranges, Klamath Mountains, and the Cascade Range (Norris & Web 1990; CGS 2002).

#### 4.3.1 Coast Ranges

The Coast Ranges are a series of northwest-southeast trending mountains extending from the Oregon border along the Pacific Coast to just north of Santa Barbara, and includes most of Del Norte and Humboldt counties and all of Mendocino County (CGS 2002). In southern Trinity County lies the highest point: Solomon Peak at 7,581 feet. The ranges are dissected by waterways created by the drowning of river-cut and block-faulted valleys. Sedimentary rocks dominate, which are underlain by the Franciscan Formation in the northern portion. This basement rock is associated with sea-floor spreading and plate tectonics in developing the continental margin. As a result, the geologic history is directly affected by major faults such as the San Andreas. Near the outlets of the Mattole and Eel rivers is the Mendocino Triple Junction, where the Pacific, North American, and Juan de Fuca crustal plates meet.



The lower reaches of the Klamath, Mad, Eel and Russian rivers tend to follow the structural pattern of faults or folds. Muddy sandstone, or graywacke, is the most common rock type in the Coast Ranges. Being naturally unstable, the Franciscan Formation is associated with more landslides than any other geologic formation in the state. Heavy winter rainfall is also associated with more landslide occurrences.

#### 4.3.2 Klamath Mountains



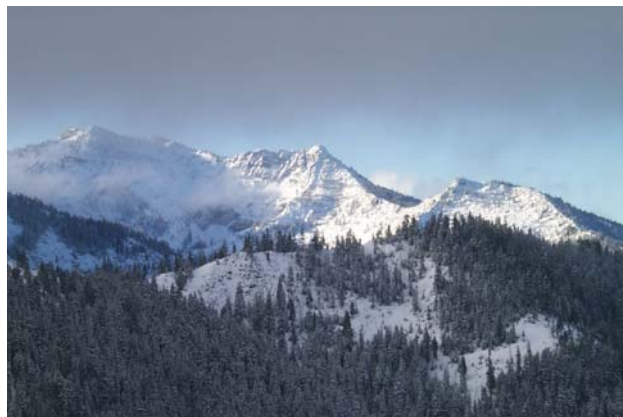
Northeast of the Coast Ranges province is the Klamath Mountains province, the least known geologically due to its relative inaccessibility (CGS 2002). From north to south, its ranges include the Siskiyou, Scott Bar, Scott, Salmon, Trinity Alps, Trinity, and South Fork mountains. Summits average between 5,000 and 7,000 feet, with Thompson Peak being the highest at 9,002 feet. Glaciers formed on the higher peaks during the Pleistocene, carving glacial lakes and peaks and leaving glacial moraines. The Klamath and Trinity Rivers and their tributaries intersect the province.

Geologists continue to find the complex patterns of rocks in the Klamath Mountains a topic of debate due to multiple plate interactions since the early Paleozoic era. The Klamath block's rocks get older moving from west to east. These rocks vary in their resistance to erosion. For example, the Condrey Mountain schist near the Oregon border is far more resistant than older

rocks surrounding it, while granitic rocks in younger plutons (130 to 170 million years) tend to be highly erosive. The Klamath province had significant uplift in the last several million years, as indicated by the rapid downcutting by rivers, even in resistant rock. Much of Siskiyou and Trinity counties and eastern portions of Del Norte and Humboldt counties are within this province.

#### 4.3.3 Cascade Range

East of the Klamath Mountains province is the Cascade Range, a chain of volcanic peaks that is an extension of provinces from the north in Oregon and Washington. This range encompasses Siskiyou County from Shasta Valley to the east and south. Mount Shasta is the highest point in the province, at 14,162 feet, and was an active volcano as recently as 1786. Basalt is the most dominant and oldest rock, followed by andesite as typified by Mount Shasta. Major rivers dissecting the range are the Klamath and its tributary, the Shasta, and the headwaters of the Sacramento.



*Siskiyou County terrain*

#### 4.4 Soils

Soils are weathered rocks mixed with other materials. The stability of the soils in the North Coast region vary by type and is closely associated with the qualities of underlying rock. Two soil types are particularly known for high erosion rates. In the Franciscan Formation of the Coast Ranges, soils are derived from incompetent schist high in clay content which tend to be very slippery on steep slopes. Slopes of this soil type are often hummocky and grass-covered. In the Klamath Mountains, the granitic rocks weather into decomposed granite, or “DG”, soils. These sandy soils do not stick together well (i.e., are non-cohesive) and are highly erosive when exposed through removal of vegetation. Soil that is eroded into the stream channel or drainage system becomes sediment, which is a pollutant (see Water Quality section below). Alluvial valleys usually contain productive clay-loam and silt-loam soils used for farming.

#### 4.5 Climate

A wide range of average annual precipitation levels can be found in the region: from a low of 10 inches in eastern Siskiyou County to a high of more than 100 inches in the Smith River Basin of Del Norte County (CDWR 1998). Rainfall generally decreases to the south. Most precipitation



falls during the winter months as rain in the coastal and lower elevation areas, and as snow in the mountains above 5,000 feet. However, summer thunderstorms can also occasionally deliver significant and intense rainfall.

Fog predominates along the narrow coastal belt and moderates the temperature. Inland temperatures can be extreme, ranging during the year from below zero to greater than 100 degrees (F). Humidity tends to be low inland.

#### 4.6 Air Quality

Air pollution is regulated by emission standards and ambient air quality standards set by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB). Attainment for certain pollutants means that the values set by these agencies for clean, healthy air are not exceeded in an area. California standards can be, and often are, higher than federal standards. Trends are upward for air quality in most air basins of the state due to new laws, better regulations, and improved technologies (CDF 2003).

Air quality is generally good in the five county region, as shown in Table 4-6 (Calif. ARB 2004).

Table 4-6. Attainment of Ambient Air Quality Standards by County

Pollutant	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>
Ozone	yes	yes	yes	yes	yes
Suspended particulate matter (PM10)	no	no	no	yes	no
Carbon monoxide	yes	No - transitional	No - transitional	yes	yes
Nitrogen dioxide	yes	yes	yes	yes	yes
Sulfur dioxide	yes	yes	yes	yes	yes
Lead	yes	yes	yes	yes	yes
Sulfates <sup>1</sup>	yes	yes	yes	yes	yes
Hydrogen sulfide <sup>1</sup>	yes	yes	yes	yes	yes
Vinyl chloride <sup>1</sup>	yes	yes	yes	yes	yes

<sup>1</sup>/ no Federal standard set, only State.

The five counties are located within two different state-designated air basins: North Coast (Del Norte, Humboldt, Trinity and Mendocino) and the Northeast Plateau (Siskiyou).

The sparsely populated Northeast Plateau Basin is in compliance with all state and federal ambient air quality standards based on monitoring data for 2001 through 2003. However, it was previously designated as non-attainment for ozone and suspended particulate matter smaller than 10 microns in size (PM10). The only ozone violations had occurred in Yreka. Ozone air pollution is not carried into this remote basin from large urban areas, unlike many other regions in California (Calif. ARB 2004).

Suspended particulate matter (PM 10) is made up of dust, mist, ash, smoke, and fumes that can come from various sources. The PM 10 problem areas in three counties of the North Coast Air Basin are centered in the urban areas of Eureka, Crescent City, and Weaverville, where 1991 emission inventories revealed that unpaved road dust was the largest single source followed by

residential fuel combustion, paved road dust, and forest management burning (North Coast Unified Air Quality Management District 1995). The trend over the past two decades shows a slow decline in the mean annual PM10 value. Strong cold-air inversions that trap particulate matter are one of the factors in creating poor air quality in valley areas of the region. Woodstove smoke is presently a primary cause of PM10 state violations during winter months (North Coast Unified Air Quality Management District 1999).

Another emission problem in the region has been odorous emissions, such as sulfur compounds emitted at pulp mills. Improvements using best available technology have reduced sulfur emissions in Humboldt County to attainment levels (North Coast Unified Air Quality Management District 1999).

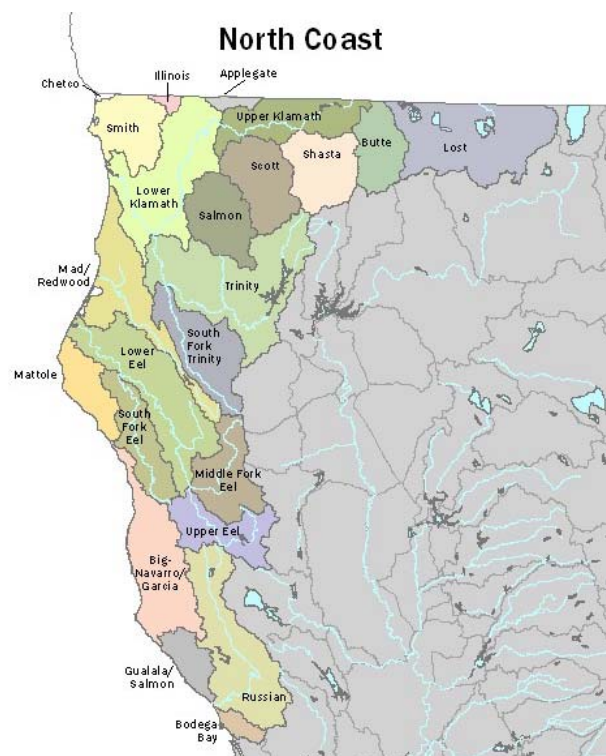
Naturally-occurring asbestos can also be an air quality problem when disturbance of rock and soil containing asbestos releases fibers to the air. According to the California Air Resources Board, sources of asbestos emissions include unpaved driveways surfaced with ultramafic rock, construction in ultramafic rock deposits, or rock quarrying activities in ultramafic rock. Each of the five counties has areas of ultramafic rocks likely to contain naturally occurring asbestos, with large deposits in Siskiyou and Del Norte counties. State air quality standards currently prohibit the application of rock containing more than 0.25% asbestos on road surfacing projects, with minor exceptions (Calif. ARB 2001).

#### 4.7 Water Quantity

Fig. 4-3 North Coast Sub-Basins

The North Coast region's multiple rivers can be delineated by hydrologic unit, or major sub-basins, as noted in Figure 4-3 (CDF 2004). Of the region's average annual precipitation of 55.9 million acre-feet (maf) of water, 28.9 maf (or 52%) is distributed as runoff (CDWR 1998). The balance is primarily consumed by plants through transpiration or evaporated from adjacent soil surfaces (evapo-transpiration or ET).

Stream runoff patterns differ greatly by year. The December 1964 flood on the Eel River was measured at 648,000 cubic feet per second (cfs) at Scotia, the largest recent flood event measured in California (CDWR 1998). The second largest flood event was also on the Eel River, in February 1986 with a discharge of 304,000 cfs. Average annual runoff in the Eel River is 6.3 maf, while the larger Klamath River's flow is 11.1 maf.



Drought years, such as occurred in 1976-77, 1987-1994, and 2001, significantly reduced streamflows throughout the region. Some reaches of normally perennial rivers and streams are dry during the summer months of critically dry water years .

As California's wettest region, the NorthCoast's water supply serves regional as well as statewide water and hydropower needs and beneficial uses. Multiple dams store water in reservoirs throughout the region, with the major ones blocking anadromous fish passage (Table 4-7). Water is exported out of the Trinity River Basin into the Central Valley through a federal system of water storage and delivery facilities (Trinity Lake) that also produce hydropower. Several exports between basins in the region occur: Mad River for water supply to Humboldt Bay region (Ruth Reservoir) and the Eel River for water and power supply to Russian River (Lake Pillsbury / Potter Valley Project). In addition, some Russian River water is exported to Marin County and North San Francisco Bay (via the Sonoma-Petaluma aqueducts). Iron Gate and Copco dams on the Klamath River provide hydropower, while Lake Shastina on the Shasta River stores water for irrigation use. Lake Mendocino on the upper Russian River is a water supply and flood control facility.

Table 4-7. Major dams restricting salmon and steelhead access to habitat in the Five County Region, Northwestern California<sup>1</sup>

ESUs with listed fish	Dam / Reservoir	Capacity (1,000 acre-ft)	Hydrologic Unit
Southern Oregon-Northern California Coho Salmon	Copco Dam #1/ Lake Copco	47	Upper Klamath
	Iron Gate Dam & Reservoir	58	Upper Klamath
	Dwinnell Dam / Lake Shastina	50	Klamath - Shasta
	Clair Engle Dam /Trinity Lake	2,448	Upper Trinity
	Lewiston Dam & Reservoir	15	Upper Trinity
	Mathews Dam / Ruth Lake	52	Mad
	Scott Dam/ Lake Pillsbury	80	Upper Eel
Central Calif. Coast Coho Salmon	Coyote Dam /Lake Mendocino	122	Upper Russian
California Coastal Chinook Salmon	Scott Dam/ Lake Pillsbury	80	Upper Eel
	Coyote Dam /Lake Mendocino		Upper Russian
Northern California Steelhead	Mathews Dam / Ruth Reservoir	52	Mad
Central California Coast Steelhead	Coyote Dam /Lake Mendocino	122	Upper Russian

1/ CDWR (2005). *California Reservoir Summary*.

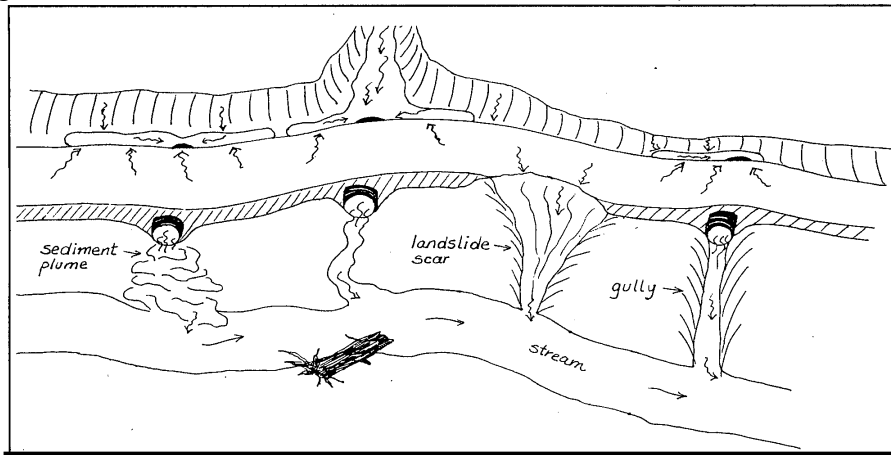
Modifications to dam releases to improve fish flows and habitat in damaged reaches has increased in the past decade, particularly since the ESA listings of salmon and steelhead. Operations of the Bureau of Reclamation's projects on both the upper Klamath and Trinity rivers have sought to balance reservoir water storage functions with fishery protection. The timing and volume of the increased streamflow releases remain controversial on both rivers, however. In recent years, the Trinity River exports to the Central Valley region have ranged from 669,000 to 1.11 million acre-feet per year (depending on the water year type) (CDWR 2005).

Many of the region's major rivers are included in the Federal and State Wild and Scenic Rivers acts to preserve their free-flowing character and protect them from water development. This wild and scenic river use is the largest applied water use in the North Coast, ranging from 6.5 to 30.9 million acre-feet (CDWR 2005). Urban water use averages about 140,000 to 150,000 acre-feet per year while irrigated agriculture's use ranges from 633,000 to 806,000 acre-feet annually in the hydrologic region defined by the California Water Plan (which also includes Sonoma

County). Other annual applied water uses include instream flow (1.4 million acre-feet) and managed wetlands (254,000 to 424,000 acre-feet).

Roads often alter the hydrologic pattern of natural stream networks (Figure 4-4). Their intersection of the hillslope disrupts the natural surface and subsurface flow of runoff and causes roads to become “hydrologically connected” (Furniss et al. 2000). Inboard ditches capture this runoff from the hillslope, road surface, and cutslope and deliver it to another location, usually through a stream crossing or a cross-drain (ditch relief culvert).

Figure 4-4. How Roads Can Be Connected to Streams (Furniss et al. 2000).



## 4.8 Water Quality

Water quality conditions in the region vary from pristine to contaminated, but for the most part they generally meet or exceed the water quality objectives of the State (NCRWQCB 2001).

### 4.8.1 Water Quality Regulations

California’s water quality regulations derive from both the state Porter-Cologne Water Quality Control Act (California Water Code, Division 7) and the federal Clean Water Act (as amended). The state agency with primary responsibility for the coordination and control of water quality in the five county area is the North Coast Regional Water Quality Control Board. The Water Quality Control Plan for the North Coast Region (2001) is the guiding document of the program of actions for the Regional Water Board. The U.S. Environmental Protection Agency (EPA) enforces the Clean Water Act, but delegates much of its implementation to the State Water Resources Control Board and the North Coast Board.

If the water quality of a river or stream does not meet the state’s water quality objectives, it becomes listed as ‘impaired’ under Section 303(d) of the Clean Water Act. This section also requires the state and the EPA to establish a Total Maximum Daily Load (TMDL) for each pollutant. TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards which will ensure protection of beneficial uses. For North Coast streams, sediment and temperature are the most commonly listed pollutants (Table

4-8). In addition, a few streams are listed as out of compliance for dissolved oxygen and nutrients and some reservoirs for mercury.

**Table 4-8. Impaired Rivers Scheduled for a TMDL Pollutant Target in the Five County Region.**

([//www.waterboards.ca.gov/northcoast](http://www.waterboards.ca.gov/northcoast) )

<b>River Name</b>	<b>County Location</b>	<b>Listed Pollutant</b>	<b>Due Date</b>
<i>Albion River</i>	<i>Mendocino</i>	<i>Sediment</i>	<i>12/01</i>
<i>Big River</i>	<i>Mendocino</i>	<i>Sediment &amp; Temperature</i>	<i>12/01</i>
Eel River – Delta	Humboldt	Sediment & Temperature	12/06
<i>Eel R. – Middle Fk</i>	<i>Mendocino</i>	<i>Sediment &amp; Temperature</i>	<i>12/03</i>
Eel R. – Middle Main	Mendocino	Sediment & Temperature	12/05
<i>Eel R. – North Fk.</i>	<i>Mendocino / Trinity</i>	<i>Sediment &amp; Temperature</i>	<i>12/02</i>
<i>Eel R. – South Fk</i>	<i>Mendocino/ Humboldt</i>	<i>Sediment &amp; Temperature</i>	<i>12/99</i>
Eel R. – Upper Main	Mendocino	Sediment & Temperature	12/04
Elk River	Mendocino	Sediment	12/09
Freshwater Creek	Humboldt	Sediment	12/10
<i>Garcia River*</i>	<i>Mendocino</i>	<i>Temperature / Sediment</i>	<i>12/00</i>
<i>Gualala River</i>	<i>Mendocino/Sonoma</i>	<i>Sediment</i>	<i>12/01</i>
Klamath River – all	Siskiyou /Humboldt / Del Norte	Nutrients & Temperature	4/04
Klamath - mainstem	Siskiyou /Humboldt / Del Norte	Low Dissolved Oxygen	12/04
Mad River	Humboldt / Trinity	Sediment & Turbidity	2/07
<i>Mattole River</i>	<i>Mendocino/ Humboldt</i>	<i>Sediment &amp; Temperature</i>	<i>12/02</i>
<i>Navarro River</i>	<i>Mendocino</i>	<i>Sediment &amp; Temperature</i>	<i>12/00</i>
<i>Noyo River</i>	<i>Mendocino</i>	<i>Sediment</i>	<i>12/99</i>
<i>Redwood Creek</i>	<i>Humboldt</i>	<i>Sediment</i>	<i>12/98</i>
Russian River	Mendocino/Sonoma	Sediment	12/11
Salmon River	Siskiyou	Nutrients & Temperature	1/05
Scott River	Siskiyou	Sediment & Temperature	4/05
Shasta River	Siskiyou	Low DO & Temperature	9/05
<i>Ten Mile River</i>	<i>Mendocino</i>	<i>Sediment</i>	<i>12/00</i>
Tomki Creek	Mendocino	Sediment	12/04
<i>Trinity River</i>	<i>Trinity/ Humboldt</i>	<i>Sediment</i>	<i>12/01</i>
<i>Trinity R.-South Fk.</i>	<i>Trinity/ Humboldt</i>	<i>Sediment</i>	<i>12/98</i>
Trinity R.-South Fk.	Trinity/ Humboldt	Temperature	12/08
<i>Van Duzen River</i>	<i>Humboldt</i>	<i>Sediment</i>	<i>12/99</i>

*Italics indicate that technical TMDL is complete. \*Implementation Plan also complete and implementation ongoing.*

Technical TMDLs (those with analysis supporting the calculation of the loading capacity and load allocations for an impaired waterbody) are completed for many of the streams, with most of the remaining to be done within the next few years. Only the Garcia River has completed an Implementation Plan for its technical TMDL, which is actively being carried out. Regulatory actions (such as a permit, waiver, or enforcement order) by the Regional Water Board are one mechanism to implement the TMDL. The Basin's Water Quality Control Plan can be amended in the form of an Action Plan to meet the TMDL. In addition, non-regulatory actions are also possible (NCRWQCB 2004).

#### 4.8.2 Roadways and Water Quality

As noted in the 2002 EA, roadways are a source for materials that, when washed into watercourses, can harm water quality and aquatic life (NMFS 2002). They are also a medium for transporting substances deposited on the roadway, such as oil and grease from vehicles. In urban areas, roadway runoff is often a major source of chemical contaminants (Forman et al. 2003). In rural areas like the North Coast region, sediment is the primary water quality concern from roads.

When roads are hydrologically connected (see Figure 4-4), the concentrated flow of water can generate sediment if it crosses on unprotected soils, develops gullies, or cuts into streambanks. It can also trigger landslides from oversaturated conditions, especially on fillslopes. Disconnecting roads from streams involves limiting the concentration of surface discharge and using permeable soils on the natural ground and road fill slopes to infiltrate runoff and convert it to subsurface flow before it can reach a stream.

Long cited as a major source of sediment in the North Coast region is erosion from logging roads. Roads were estimated to contribute up to 85 percent of the erosion associated with timber harvest, depending on the slope of the terrain (Rice 1999). However, continuous improvements in California's forest practice rules since 1976 have led to a significant reduction in road-related erosion in logged areas (Rice 1999). This reduction is attributable to better sizing and placement of culverts and to less reliance on culverts to handle runoff from road prisms. Measures used to reduce drainage-related erosion on logging roads also include outsloping, rolling dips, and water bars. Poor road construction and maintenance were associated with higher erosion rates. In contrast, routine maintenance removed sediment deposited in roadside ditches from cut bank erosion and other sources and minimized the opportunity for it to enter a watercourse.

Road erosion inventories have recently improved the understanding of existing and potential sediment sources at the site-specific scale. One of the most common methods being used in the state is that described in the California Dept. of Fish and Games' California Salmonid Stream Habitat Restoration Manual, specifically Part X Upslope Assessment and Restoration Practices by Weaver & Hagans (2004). Grant funding has accelerated the completion of such inventories on public and private roads.

Within the Five County region, there are 4,790 miles of County roads and approximately 16,600 culverts (including ditch relief culverts). The Five Counties Salmon Conservation Program (5C) has committed to a long-term, systematic, prioritization-based, sediment reduction program on county roads to improve the quality of water and salmonid habitat. The Program has performed county road erosion inventories in Del Norte, Humboldt, Mendocino, and Trinity counties under several state grants. The watersheds inventoried were selected based on a 1998 collaborative prioritization effort. The remaining areas (Siskiyou County and portions of Trinity and Humboldt counties) should be completed within two years. Methodology has followed a variation of the above Weaver & Hagans' protocol.

The goals of the 5C's road erosion inventories are to: 1) identify specific sites along county roads and facilities that are contributing sediment to waterways; 2) prioritize implementation treatments to assure economic, biological, management and physical effectiveness; and 3)

identify sites where excess material (spoils) generated from construction and maintenance projects can be stored with minimal potential for sediment delivery into watercourses. For the road inventories completed on 2,113 miles (through 2004), Table 4-9 summarizes the amount of existing or potential road-related erosion for the county road systems in four of the counties. Stream crossing sites represent the majority of the potential erosion due to the volume of material that could be washed out from road failures at undersized culverts blocked with debris during a flood event.

Table 4-9. 5C Summary of County Road-related Erosion Sites by Volume, as of 2004

<b>Erosion Site</b>	<b># sites</b>	<b>Total volume (yd3)</b>	<b>% of Total</b>
Ditch relief culvert	2056	253,684	8.3
Gully	9	2,511	0.1
Landslide (hillslope)	24	44,385	1.4
Landslide (cutbank)	29	22,630	0.7
Landslide (fillslope)	64	35,403	1.2
Other problem	86	27,085	0.9
Road bed	204	27,296	0.9
Road ditch	363	57,672	1.9
Spring	76	6,198	0.2
Stream crossing	5716	2,592,561	84.4
<b>Total</b>	<b>8627</b>	<b>3,069,425</b>	<b>100</b>

*(Prepared by Sandra Perez, Trinity County Planning Dept., March 2005)*

Remedial measures to correct existing and potential county road erosion include (but are not limited to): replacing undersized culverts, creating critical dips at stream crossings, outsloping the road surface, adding more ditch relief culverts to insloped roads, rocking or paving the road surface, reconnecting the road drainage as much as possible to the natural drainage patterns, revegetating cutbanks and fillslopes, and repairing 'shotgun' culverts. These sediment control measures are all addressed as Best Management Practices (BMPs) in the 5 C Road Maintenance Manual.

Various road maintenance practices can potentially contaminate streams with chemicals or other unnatural materials without proper management (Five Counties 2002; ODOT 1999; WashDOT 2002). Road surfacing projects have the potential to discharge these materials: asphalt concrete binder, asphalt cement, liquid asphalt, asphalt concrete (AC), asphaltic emulsion, sealant material, Portland cement concrete (PCC), concrete rinse water, concrete grindings and cuttings, concrete waste, and diesel oil. Dust abatement work can possibly cause the discharge of dust palliatives into the stream or storm water drainage system: calcium magnesium acetate, magnesium chloride, emulsified asphalt, or lignin sulfates, among other chemicals. Road maintenance yards present pollution risks through the storage and use of materials that could be harmful to aquatic life: fuel, oil, chemicals, hazardous waste, heavy metals, organic and inorganic materials, fertilizer, pesticides, solvents, and paint products. Bridge cleaning and maintenance can possibly discharge paint, metal grindings, concrete grindings, expansion joint filler, concrete mix and rinse water. Proper snow removal and ice control methods are necessary to prevent the discharge of de-icing agents, anti-icing chemicals, and sediment to watercourses. All of these potential water quality concerns and their causes are also addressed through the Manual's BMPs.

In response to Clean Water Act requirements, the California Department of Transportation (Caltrans) developed a storm water management plan in 2003 to reduce the discharge of pollutants from storm water drainage systems associated with Caltrans highways and highway-related facilities, properties and activities to the maximum extent practicable. This revised plan describes how the agency is complying with the NPDES permit (Order No. 99006-DWQ) issued by the State Water Resources Control Board in 1999.

#### 4.8.3 Water Temperature

River systems listed as impaired for temperature are the: Eel (Delta, Middle Fork, Middle Main, North Fork, South Fork, Upper Main), Klamath, Mattole, Navarro, Salmon, Scott, Shasta, and Trinity (South Fork). “Cold water fisheries” is the beneficial use for which the stream temperatures are considered too warm, particularly at levels producing sublethal effects during the summer rearing months for juvenile salmonids. Causes of excessive stream temperature include lack of shade from riparian vegetation, shallow pools due to sedimentation, overly wide stream channels due to aggradation or alteration, low stream flows due to drought or water diversions, warm water releases from reservoirs, and channel aspect. Protecting and replacing riparian vegetation is the primary remedial measure for reducing stream temperature, along with sediment reduction measures.

#### 4.8.4 Sediment and Turbidity

Fine sediment impacts salmon and steelhead habitat by filling in pools and spawning gravels. Too much fine sediment can smother eggs laid in a stream’s gravels and reduce the quality of aquatic invertebrates available as fish food (Waters 1995). When in suspension, fine sediment creates turbid water conditions which, when excessively high, can affect the gills and respiratory health of fish and impact aquatic invertebrates.

River systems in the region listed as impaired for excessive sediment are the: Albion, Big, Eel (Delta, Middle Fork, Middle Main, North Fork, South Fork, Upper Main), Elk, Freshwater Creek, Garcia, Gualala, Jacoby Creek, Mad, Mattole, Navarro, Noyo, Redwood Creek, Russian, Scott, Ten Mile, Tomki, Trinity (mainstem & South Fork), and Van Duzen. These sediment-impaired watersheds amount to about 59% of the North Coast region (NCRWQCB 2004).

Sediment TMDLs have been established by the Regional Board or the U.S. Environmental Protection Agency (EPA) for all of the above water bodies except for six. The mainstem Eel, Elk, Freshwater, and Scott TMDLs are near completion in 2005, but the Jacoby, Mad, and Russian TMDLs have not begun yet. Only the Garcia River has a Sediment TMDL implementation plan completed. (NCRWQCB 2004).

North Coast sediment sources are both natural and human in origin and include: landslides (shallow and deep-seated), gullies, road-related mass wasting, road-related stream crossing failures, road-related surface erosion, streambank erosion, logging skid trails, farmland erosion, and logging-related mass wasting (NCRWQCB 2004). Remedial measures involve road sediment reduction BMPs (see 4.8.2 above), farm conservation practices, road decommissioning, replacement of undersized culverts, improved timber harvest practices, and others.



#### 4.8.5 Dissolved Oxygen

Excessively low dissolved oxygen (DO) levels can stress or kill fish. Minimum DO levels are watershed-specific for the region and range from 5.0 to 9.0 mg/l (NCRWQCB 2001). During critical spawning and egg incubation periods, the minimum level for waters designated for spawning use is 9.0 mg/l. River systems listed as impaired for low levels of dissolved oxygen are the Shasta River and Klamath River mainstem. The TMDL technical reports on these two rivers are due in late 2005. Low DO levels are often associated with sluggish sites having high algal production, which demands oxygen during the decomposition process. Algal growth is supported by nutrient-rich and warm waters.

#### 4.8.6 Other Water Quality Issues

The pollutant MTBE, a gasoline additive in California, can readily contaminate groundwater supplies from leaking underground fuel tanks. It has been detected in groundwater at the following County Road Maintenance Yards: Mendocino DOT (Covelo, Ft. Bragg, Ukiah), Siskiyou DPW (Tule Lake), and Trinity DOT (Hayfork, Hyampon, Junction City, Lewiston) (Trinity County Planning Dept. 2002).

Two reservoirs, Lake Mendocino and Lake Pillsbury, are listed as impaired for mercury (NCRWQCB 2004). Mercury concentrations in Trinity Lake and River are at high enough levels to warrant a healthy advisory for consumption of fish, with the likely mercury sources being abandoned gold mining sites in the upper Trinity (Calif. OEHHA 2005).

### 4.9 Fish and Wildlife

#### 4.9.1 Fish

Fish production occurs both naturally and artificially. Fish hatcheries in the region are primarily operated by the California Dept. of Fish and Game and include: Iron Gate Hatchery, Mount Shasta Hatchery, Mad River Hatchery, Trinity River Hatchery, Noyo River Egg Collecting Station, and Van Arsdale Fisheries Station. Their purpose is to supplement sport and commercial fisheries, including mitigation for lost habitat above large dams. Hatchery-reared fish include native and non-native species.

##### 4.9.1.1 Native Fish Species

The northwestern region of California contains two of the state's six ichthyological provinces: Klamath and North Coast (Moyle 2002). Endemic species are found in each province, reflecting their long isolation from each other. Several fish assemblages are recognized: 1) resident trout in the upper reaches of tributaries; 2) mixed anadromous-resident fishes in the main river and most tributaries; and 3) estuarine fishes in the lower reaches of river.

Anadromous salmonid species native to the area are: coho salmon, Chinook salmon, steelhead rainbow trout, and coastal cutthroat. Chinook salmon are fall-run in most rivers, but the spring-

run also occurs in the Klamath-Trinity River system. Occasional strays are found of sockeye and pink and a small run of chum salmon are found in the Smith, Klamath, and Trinity. Non-salmonid anadromous native fish are Pacific lamprey (*Lampetra tridentata*), sturgeon (*Acipenser sp.*), and eulachon (*Thaleichthys pacificus*). The mixed assemblage's resident fish include: threespine stickleback, prickly and coastrange sculpin, California roach, and Sacramento sucker. Estuarine fishes in North Coast streams are also represented by topsmelt, starry flounder, tidewater goby, and staghorn sculpin. Upper Klamath River has different fish assemblages, including lake dwelling species: Klamath Lake sculpin, slender sculpin, shortnose sucker, and Lost River sucker. Other warmwater species are Klamath largescale sucker, blue chub, and Klamath tui chub. (Moyle 2002)

Native fish species diversity ranges from 5 in the Noyo River to 21 in the Russian River system, as noted in Table 4-10. Non-native fish species diversity ranges from 0 in many smaller coastal streams to 19 in the Russian River. Most of these non-native species were introduced intentionally through stocking, for such purposes as sport, food, or insect control (Marchetti et al. 2004).

Table 4-10. Diversity of native and nonnative fish species in North Coast watersheds

<b>Watershed</b>	<b>Original native fish diversity</b>	<b>Nonnative fish diversity</b>	<b>Proportion of nonnative species from stocking</b>
Russian River	21	19	0.71
Gualala River	8	0	
Garcia River	8	0	
Navarro River	9	0	
Big River	8	0	
Little River	9	0	
Noyo River	5	0	
Ten Mile Creek	7	0	
Mattole River	8	0	
Bear River	9	0	
Eel River	14	10	0.50
Mad River	14	8	0.88
Redwood Creek	12	6	0.67
Lower Klamath River	20	14	0.80
Smith River	12	0	

Source: Marchetti et al. 2004.

Native fish fauna of California are rapidly being depleted, with 58% of all inland species extinct or in serious decline (Moyle 2002). Much of the cause is due to massive changes in the State's aquatic ecosystems and the limited range of many of the endemic fish species. Their reduced abundance is related to multiple factors: water diversions, habitat modification, pollution, alien (invasive) species, hatcheries, and exploitation.

#### 4.9.1.2 Invasive Fish Species

Not all introduced or alien fish species have become established or invasive, but many have. Fish species presently found in, but not native to, the North Coast region's streams, lakes and reservoirs include: American shad, brown trout, brook trout, largemouth bass, black crappie,

white crappie, green sunfish, pumpkinseed, bluegill, brook stickleback, western mosquitofish, brown bullhead, yellow perch, Sacramento perch, goldfish, golden shiner, wakasagi, fathead minnows, and Sacramento pikeminnow. Introduced species have become more common than native species in the lakes and reservoirs of the upper Klamath (Moyle 2002).

Table 4-10 above lists the status of nonnative fish species found in the region's major streams. Five rivers have been impacted, mostly due to artificial stocking. The Eel River, for example, has had at least 10 species of fish introduced in the drainage, which historically contained 12-14 native fish species. The Sacramento pikeminnow (*Ptychocheilus grandis*) invaded the Eel River in over 400 km of suitable stream habitat in less than 15 years, after a single introduction in the headwaters of the upper Eel at Lake Pillsbury (Brown and Moyle 1997).

Native fish are impacted by invasive, nonnative fish species in several ways. Competition between species for food or space allows an aggressive alien species to dominate habitat of a native fish. Predation of native species by the alien species can depress or eliminate local stocks. In the Eel River, the introduced pikeminnow forages on outmigrating juvenile salmon in the spring, which has helped depress the river's chinook salmon population (Moyle 2002). Other interactions causing problems include: habitat interference, disease, and hybridization.

Warmwater fish species are especially able to invade the region due to construction of reservoirs and altered stream channels. Alien fish species introductions to California's streams are due to various reasons and causes: ornamental, food, sport, forage, insect control, bait, aquaculture, weed control, ballast water, hitchhiker, pet fish release, and mistake (Moyle 2002).

#### 4.9.1.3 Threatened and Endangered Fish Species

Many fish species in the North Coast region are listed as threatened or endangered under the federal and state endangered species acts (ESA & CESA), as noted in Table 4-11. Additionally, several other species are listed as special concern species that might soon qualify as threatened or endangered status.

Table 4-11. Status of Fish Species in North Coast Region

Common Name / <i>Genus species</i>	Federal Status <sup>1</sup>	State Status <sup>1</sup>	County Locations <sup>2</sup>
Shortnose sucker <i>Chamistes brevirostris</i>	E	E	S
Lost River sucker <i>Deltistes luxatus</i>	E	E	S
Klamath smallscale sucker <i>Catostomus rimiculus</i>	E	E	S
Coho salmon <i>Oncorhynchus kisutch</i>	T E	T	D, S, H, T, M M
Chinook salmon <i>Oncorhynchus tshawytscha</i>	T		H, M
Steelhead <i>Oncorhynchus mykiss</i>	T		H, M
Coastal Cutthroat Trout <i>Oncorhynchus clarki</i>		CSC	D, H
Klamath River Lamprey		CSC	D, H, S

Common Name / <i>Genus species</i>	Federal Status <sup>1</sup>	State Status <sup>1</sup>	County Locations <sup>2</sup>
<i>Lampetra similis</i>			
Green Sturgeon <i>Acipenser medirostris</i>	FSC	CSC	D, H, S, T
Eulachon <i>Thaleichthys pacificus</i>		CSC	D, H
Tidewater goby <i>Eucyclogobius newberryi</i>	E		D, H, M

<sup>1</sup> E= endangered; T= Threatened ; CSC = Calif. Special Concern species; FSC = Federal Special Concern species;

<sup>2</sup> D=Del Norte, H= Humboldt, M=Mendocino, S=Siskiyou, T=Trinity. Sources: CDFG (2000)

The current and historic distributions of salmon and steelhead habitat in the region are identified in various tables (see <http://swr.nmfs.noaa.gov/hcd/mendocino.pdf>) and maps (Agrawol et al. 2005). As noted in Table 4-7, large dams have blocked migratory fish access to many upper reaches of streams in the North Coast. Smaller dams and barriers, primarily culverts at road crossings, have also blocked adult and juvenile fish passage. Inventories evaluating county road culverts for fish passage have been completed and priority lists for improvement developed for each of the five counties (e.g., Taylor et al., 2002). Other fish passage assessments are being, or have been, completed for all types of barriers in coastal watersheds and for Caltrans' managed road stream crossings in the North Coast (Calif. Coastal Conservancy 2003). Timber companies are also assessing and correcting fish passage problems as part of their timber harvest planning (THP) process, due to ESA and CESA requirements. Barriers on most city and private roads, however, have not been inventoried.

Besides habitat blocked by dams and impassable culverts, fish species declines are attributed to multiple causes over the past 100 or more years: reduced or altered flows due to diversions, warmer stream temperatures below dams, entrainment by diversions, creation of reservoirs, alteration of estuaries, stream channel alterations, wetland drainage, poor resource management practices (e.g., grazing, logging, mining), urbanization, water pollution, and watershed damage. Despite large hatchery production, salmon and steelhead populations have essentially collapsed in the state. Some scientists blame negative effects of hatchery-reared fish on wild fish and fisheries. These impacts include genetic changes, spawning interference, spread of disease, juvenile predation, and competition for food and space (Moyle 2002).

#### 4.9.2 Wildlife

Many wildlife species inhabit the North Coast's diverse habitat, some of which is specifically managed for this purpose. The U.S. Fish and Wildlife Service manages national wildlife refuges and other special habitat areas in the region: Lower Klamath, Tule Lake, Clear Lake, Humboldt Bay & Lagoon, and Big River Estuary. Marine life refuges and reserves are operated by the California Dept. of Fish and Game (CDFG), and include the California Islands Wildlife Sanctuary (in Del Norte and Humboldt counties) as well as several small ones off the Mendocino County coast. Almost twenty Wildlife Management Areas (managed by CDFG), designed to promote the production and preservation of fish and wildlife, are designated in Del Norte, Siskiyou, and Humboldt counties. Mendocino County is home to special habitat sites for tule elk and pronghorn antelope (Kreissman 1991).

#### 4.9.2.1 Threatened and Endangered Wildlife Species

In addition to the species listed under the federal Endangered Species Act are those animal species identified under the California Endangered Species Act (CESA) as threatened and endangered. Often these species are on both state and federal lists, but occasionally some are only on the state list or only on the federal list. As of January 2005, California has 47 species state-listed as Endangered and 32 species listed as Threatened; 83 federally-listed as Endangered, 40 federally-listed as Threatened; with 54 species listed under both CESA and ESA (CDFG 2005a). The American peregrine falcon was federally delisted in 1999.

The following table describes the status of those listed wildlife species (mammals, birds, reptiles, amphibians and insects) found in the five county region.

Table 4-12. Status of Listed Wildlife Species in the Region

Common Name / <i>Genus species</i>	Federal Status <sup>1</sup>	State Status <sup>1</sup>	County Locations <sup>2</sup>
Wolverine <i>Gulo gulo</i>		T	S
Point Arena Mountain Beaver	E	CSC	M
Bald eagle <i>Haliaeetus leucephalus</i>	E	E	D, H, M, S, T
Greater sandhill crane <i>Grus canadensis tabida</i>		T	S
Marbled murrelet <i>Brachyramphus marmoratus</i>	T	E	D, H, M
Northern spotted owl <i>Strix occidentalis caurina</i>	T		D, H, M, S, T
Great gray owl <i>Strix nebulosa</i>		E	D, H, S
American peregrine falcon <i>Falco peregrinus anatum</i>		E	M, S, T
California brown pelican <i>Pelecanus occidentalis californicus</i>	E	E	D, H, M
Willow flycatcher <i>Empidonax traillii</i>		E	S
Bank swallow <i>Riparia riparia</i>		T	S, others?
Lotis blue butterfly <i>Lycaeides argyrognomon lotis</i>	E		M
Trinity Bristle Snail <i>Monadenia setosa</i>		T	T
Siskiyou Mountains Salamander <i>Plethodon stormi</i>		T	DN, S

1/ E= endangered; T= Threatened; CSC= Calif. Special Concern species. 2/ D=Del Norte, H= Humboldt, M=Mendocino, S=Siskiyou, T=Trinity. Sources: CDFG (2005)

#### 4.9.2.2 Other Aquatic or Riparian Species of Concern

Another designation used by the CDFG is California Special Concern (CSC) species: these vertebrate species have declining population levels, limited ranges, and/or continuing threats that have made them vulnerable to extinction. Also, there is the Federal Special Concern (FSC) species list. Some of these species may soon reach the point where they meet the criteria for listing as threatened or endangered under the State and/or Federal Endangered Species Acts. However, these CSC and FSC listed species do not have the legal protections of the ESA and CESA listed ones.

Table 4-13. Status of Other Aquatic & Riparian Animal Species

<u>Common Name</u>	<u>Status<sup>1</sup></u>	<u>NW County Locations<sup>2</sup></u>
Trinity Bristle Snail	FSC	T
Del Norte Salamander	CSC / FSC	DN, S, H, T
Southern Seep (Torrent) Salamander	CSC / FSC	DN, S, H, T, M
Northern Red-legged Frog	CSC / FSC	DN, H, M
Tailed Frog	CSC / FSC	DN, H, S, T, M
Foothill Yellow-legged Frog	CSC / FSC	DN, S, H, T, M
Cascades Frog	CSC / FSC	S, T
Northwestern Pond Turtle	CSC / FSC	DN, S, T, H, M

1/ CSC = California Special Concern species; FSC = Federal Special Concern species; 2/ County initials used as abbreviation. Source: CDFG (2005a). [www.dfg.ca.gov/whdab/html/lists.html](http://www.dfg.ca.gov/whdab/html/lists.html)

#### 4.9.2.3 Marine Mammals

The goal of the 1972 Marine Mammal Protection Act is to ensure that marine mammals do not “diminish below their optimum sustainable population”. Those species that are at or near risk of extinction are listed under the federal Endangered Species Act. Various marine mammal species inhabit habitat on or off the North Coast’s shores and differ as to their population status.

The Steller sea lion stock of the western U.S., federally listed as endangered, can be found at various locations along the California coast, including the Del Norte rookery off Crescent City. This species is one of the few pinniped stocks to be decreasing. In contrast, the harbor seal and California sea lion recently show a positive trend in abundance. Gill-net fisheries are associated with frequent takes of pinnipeds in coastal habitat. While seals and sea lions prey on salmon and steelhead stocks listed as threatened or endangered under the ESA, the ecological interactions between marine mammals and commercially valuable fish stocks are poorly understood (Read and Wade 2000).

Pacific Coast migratory whales include: gray, humpback, blue, sei, minke, finback, right, and sperm. All except the gray whale are listed as federally endangered; this species was delisted in 1994. Human-caused mortality due to pelagic drift nets from commercial fishing boats is still affecting the sustainable population levels of humpback, minke, and sperm whales (Read and Wade 2000).

#### 4.10 Vegetation

Vegetation type varies by geography, soils, elevation, aspect, and rainfall. Conifer forests (primarily Douglas-fir, ponderosa pine, and redwood) predominate the vegetative cover in the North Coast region, followed by hardwood forests (mainly oak and madrone) and shrub lands (such as manzanita, scrub oak, chamise, mountain mahogany) (see Table 4-14). Urban areas represent a small proportion of the landscape, as noted in the table below.

Table 4-14. Area of Land Cover Classes by County, North Coast Region  
(1,000 acres) (CDF 2003)

Land Cover/ County	Del Norte	Humboldt	Mendocino	Siskiyou	Trinity	Total (1,000 acres)
Conifer Forest	439	1,343	1,055	2,427	1,536	6,800
Conifer Woodland				174	(L)	174
Hardwood Forest	110	518	639	279	251	1,797
Hardwood Woodland	(L)	33	28	1	7	69
Shrub	65	56	162	618	173	1,074
Grassland	4	221	277	188	44	734
Wetland	1	9	(L)	40	1	51
Agriculture	11	41	54	202	1	309
Barren / Other	6	28	9	65	17	125
Urban	9	32	17	20	3	72
Water	5	10	6	50	21	92
Total	649	2,293	2,248	4,064	2,053	11,307

(L) less than 500 acres

The 51,000 acres of wetlands in Table 4-14 represent freshwater habitat, including species such as cattails, bulrush, and sedges. Coastal wetlands encompass tidal flats and salt marshes. These ecosystems support eelgrass, pickleweed, and sedges, among other plants. Wetlands that provide critical wildlife habitat have significantly shrunk due to development and other pressures.

Figures on the acreage of riparian vegetation are not available, but typical riparian species include coniferous trees as well as water-loving deciduous trees and shrubs: big-leaf maple, cottonwood species, red and white alder, and willow species, among others. Riparian ecosystems provide a link or transition between terrestrial and aquatic ecosystems. Their vegetation supports a diversity of invertebrates that feed salmon and other fish, as well as provide shade and habitat structure. Large woody debris (LWD), a critical component of salmonid habitat and stream function, is often composed of older riparian conifers that fall into the stream.

Besides development threats, native plant communities are impacted by non-native, invasive plant species. These pests can compete with native species for space and water, and alter ecosystem function “by changing disturbance regimes such as frequency and intensity of fire, altering hydrologic cycles, and increasing soil erosion rates” (CDF 2003). Of the 76 non-native plant species impacting forest and rangeland resources in California, 42 are of highest concern due to their aggressive spreading and impacts to biological diversity. The Klamath/North Coast bioregion contains high numbers of the most detrimental species (CDF 2003). Examples of local plant pests are star thistle, giant reed (*Arundo donax*), pampas grass, and spotted knapweed.

## 4.10.1 Threatened and Endangered Plant Species

Both the federal and state endangered species acts include plants in their listing process. However, the CESA and the California Native Plant Protection Act additionally include a “rare” status for plants. All of these acts prohibit a person from taking endangered and rare plants, with minor exceptions. Table 4-15 describes the status of the 21 listed plant species in the five county region. Maps are available from the California Natural Diversity Database of specific known locations for the listed species and others of special concern (<http://www.dfg.ca.gov/whdab/html/plants.html>).

Table 4-15. Status of Listed Plant Species in the Region

Common Name / <i>Genus species</i>	Federal Status <sup>1</sup>	State Status <sup>1</sup>	County Locations <sup>2</sup>
MacDonald rockcress <i>Arabis macdonaldiana</i>	E	E	M
Humboldt milk-vetch <i>Astragalus agnicidus</i>		E	H
Bensoniella <i>Bensoniella oregona</i>		R	H
Point Reyes blennosperma <i>Blennosperma nanum</i> var. <i>robustum</i>		R	M
Leafy reed grass <i>Calamagrostis foliosa</i>		R	M, H, D
Siskiyou mariposa lily <i>Calochortus persistens</i>		R	S
Mendocino or Howell’s spineflower / <i>Chorizanthe</i> <i>howellii</i>	E	T	M
Ashland thistle <i>Cirsium ciliolatum</i>		E	S
Tracy’s eriastrum <i>Eriastrum tracyi</i>		R	T
Trinity buckwheat <i>Eriogonum alpinum</i>		E	S, T
Red Mountain or Kellogg’s buckwheat / <i>Eriogonum</i> <i>kelloggii</i>		E	M
Menzies’ wallflower <i>Erysimum menziesii</i>	E	E	H, M
Roderick’s fritillary <i>Fritillaria roderickii</i>		E	M
Beach layia or tidytips <i>Layia carnosa</i>	E	E	H, M
Western lily <i>Lilium occidentale</i>	E	E	D, H
Baker’s meadowfoam <i>Limnanthes bakeri</i>		R	M
Milo Baker’s lupine <i>Lupinus milo-bakeri</i>		T	M
Slender Orcutt grass <i>Orcuttia tenuis</i>	T	E	S
Yreka phlox	E	E	S



Common Name / <i>Genus species</i>	Federal Status <sup>1</sup>	State Status <sup>1</sup>	County Locations <sup>2</sup>
<i>Phlox hirsuta</i>			
North Coast semaphore grass / <i>Pleuropogon</i> <i>hooverianus</i>		R	M
Red Mountain catchfly <i>Silene campanulata</i> ssp. <i>campanulata</i>		E	M

<sup>1</sup> E= endangered; T= Threatened.; R= rare. <sup>2</sup> D=Del Norte, H= Humboldt, M=Mendocino, S=Siskiyou, T=Trinity. Sources: CDFG (2000, 2005b); USDA (2004).

The greatest threat to California's flora is loss of habitat from urbanization, according to CDFG (as cited in CDF 2003). Unlike more urbanized regions of the State, the Klamath/ North Coast bioregion maintains a high percentage area of its original plant and wildlife communities.

#### 4.11 Demography

The five county region supports a population of about 300,000 people, representing less than 1% of California's population of 33.8 million in 2000 (Table 4-16). Between 1990 and 2000, the counties' populations grew an average of 6.4%, with Del Norte County growing the fastest at over 17% and Trinity County slightly shrinking. In Humboldt and Siskiyou counties, almost half of the population lives within cities. The largest city in the area is Eureka, with over 26,000 people. Trinity County has no incorporated cities. As noted in Table 4-1, the average population density is 17 people per square mile for the region.

Table 4-16. County and City Population in the Five County Region, 1990 & 2000.

County / City (County seat)	Population - 1990	Population - 2000	% change 1990 to 2000	% pop. in cities (2000)
Del Norte <i>Crescent City</i>	23,460	27,507 7,400	17.3%	26%
Humboldt <i>Eureka</i>	119,118	126,518 26,128	6.2%	47%
Mendocino <i>Ukiah</i>	80,345	86,265 15,500	7.4%	33%
Siskiyou <i>Yreka</i>	43,650 6,925	44,301 7,325	1.5% 5.8%	47%
Trinity <sup>1</sup>	13,063	13,022	-0.3%	0%
<b>Total</b>	<b>279,636</b>	<b>297,613</b>	<b>6.4%</b>	

Source: U.S. Census Bureau (2004); <sup>1</sup> no incorporated cities in county

The coastal counties have the higher growth rates. In contrast, Siskiyou County's population decreased by 1% between 2000 and 2001 (CED 2002). Population trends tend to reflect local economic conditions (see 4.12).

Compared to the State's ethnic representation, the North Coast counties' cultural mix is quite different (Table 4-17). The region has a higher proportion of people of White and American Indian ethnicity and a much lower percentage of Asian and Latino-Hispanic ethnicities. Del Norte County is the most ethnically diverse in the region.

Table 4-17. Ethnicity of the Five Counties, 2000 (percentage)

<b>Ethnicity</b>	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>	<b>Statewide</b>
White	78.9	84.7	80.8	87.1	88.9	59.5
Black or African American	4.3	0.9	0.6	1.3	0.4	6.7
American Indian and Alaska Native	6.4	5.7	4.8	3.9	4.8	1.0
Asian	2.3	1.7	1.2	1.2	0.5	10.9
Native Hawaiian and Other Pacific Islander	0.1	0.2	0.1	0.1	0.1	0.3
Persons reporting some other race	3.9	2.4	8.6	2.8	0.9	16.8
Persons reporting two or more races	4.1	4.4	3.9	3.6	4.4	4.7
Persons of Hispanic or Latino origin	13.9	6.5	16.5	7.6	4.0	32.4

Source: U.S. Bureau of the Census(2004)

#### 4.12 Economy

The North Coast's economy has a long history of dominance by natural resource production: mining, timber harvest, farming, ranching, and fishing. Since the original gold mining era of the 1850s, economic cycles have occurred, with resource production and employment peaking and waning. An abrupt regional decline in timber harvesting began in 1989, with the change in forest management practices by the U.S. Forest Service and the Bureau of Land Management through the Northwest Forest Plan process, originally brought on by the Northern Spotted Owl listing under the ESA. Wood products employment has decreased significantly in northern California during the past 15 years. The economic impact to these rural counties caused by the reduction of federal lands-related payments (resulting from lower harvest income) was minimized by special federal legislation to hold county payments stable (Christensen et al. 2000).

Agriculture and timber continue to play an important, though reduced, role in the counties' economies (Table 4-18). Together, the five counties produce about 44% of the State's total timber production, led by Humboldt County. Mendocino County has the most agricultural employment as well as the highest value of production in the region. (Agricultural employment figures do not reflect those farmers and ranchers who are owner-operators and self-employed.)

Table 4-18. Agricultural &amp; Timber Production, 2000, in Region

	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>	<b>Total</b>
Timber production	46,133 tbf	388,886 tbf	156,101 tbf	193,408 tbf	72,735 tbf	857,263 tbf
% of State	2.3	19.8	7.9	9.8	3.7	43.5%
Agricultural employment	450	1,100	2,530	1,110	70	5,260
Ag Value	\$30.8 mil.	\$96.7 mil.	\$128.6 mil.	\$119.0 mil.	\$2.1 mil.	\$377.2 mil.

Tbf=thousand board feet. Source: Calif. Dept. of Finance

Personal income from forestry and logging remains significant in Humboldt and Mendocino counties (Table 4-19). Commercial fishing provides important income (full- and part-time) to individuals in at least Del Norte and Mendocino counties. Statewide, agriculture, forestry and fishing industries generated \$22.8 billion, about 2% of the total gross state product (US Census Bureau 2001).

Table 4-19. Fishing &amp; Forestry related personal income by county (thousands of dollars)

	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>
Fishing (2000) – SIC industry	\$17,034	(D)	\$6,746	\$86	(L)
Fishing, hunting, trapping – NAICS industry (2002)	\$10,415	(D)	(D)	\$812	\$222
Forestry & logging – NAICS (2002)	(D)	\$43,117	\$40,226	(D)	\$2,161

(D) – not shown to avoid disclosure of confidential information; (L) – less than \$50,000. Source: U.S. Dept. of Commerce

In contrast, non-agricultural employment provides the majority of local income and employment in 2000. As noted in Table 4-20, most jobs in the region are affiliated with the service industry, state and local government, and the trade industry. For example, Siskiyou County's largest single employer is the County of Siskiyou. The service industry includes the tourist segment of the economy, considered very important to certain scenic communities. Parks and recreation play a significant role in these rural counties for spending by both residents and visitors (see 4.2.3).

Table 4-20. Nonagricultural wage and salary employment, 2000, in Region

(Calif. Dept. of Finance)

	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>	<b>Total</b>
<b>Total employment</b>	7,410	49,500	30,180	13,330	3,180	103,600
Percent of Calif.	0.1	0.4	0.2	0.1	*	< 1.0%
Construction/mining	200	1,800	1,450	400	100	3,950
Manufacturing	470	6,000	5,280	1,240	270	13,260
Transportation-utility	240	1,900	1,070	700	120	4,030
Trade	1,530	11,900	7,680	3,280	600	24,990
Finance-insurance-real estate	130	2,200	940	540	70	3,880
Services	1,530	12,900	7,400	3,370	460	25,660
Federal government	140	1,000	340	700	270	2,450
State-local gov't	3,160	11,900	6,020	3,110	1,290	25,480

Road infrastructure is an important component of the local economic structure. Transportation connections within each county and to other regions is critical to the delivery of goods and services. County roads in the region connect to interstate highways, particularly I-5 and State Highway 101 for north-south and State Highways 299, 199 and 96 for west-east linkages. In some areas, private logging and ranch roads are being converted to rural residential roads. Urbanization tends to focus new roads within cities, although rural development also is stimulating new private and county road construction. Recently reduced state and federal budgets for road construction and maintenance have directly impacted county and city road budgets.

#### 4.12.1 General economic trends

Personal economic indicators reveal that people in the five counties earn, on average, below statewide levels (Table 4-21). Per capita income for the Klamath/North Coast bioregion averages about 75% of the State's median, for example, while the number of people below the poverty level is higher than average. This pattern of lower income has been true for many decades, partly reflecting the absence of higher paying urban jobs, the seasonal nature of natural resource employment, and the lower cost of living in rural areas.

Table 4-21. Personal Income Levels in Five County Region, 1999

	<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>	<b>Statewide</b>
Median household income	\$29,642	\$31,226	\$35,996	\$29,530	\$27,711	\$47,493
Per capita money income	\$14,573	\$17,203	\$19,443	\$17,570	\$16,868	\$22,711
Persons below poverty	20.2%	19.5%	15.9%	18.6%	18.7%	14.2%

Source: U.S. Bureau of the Census

On the other hand, this lower income level does not necessarily reflect overall well being. A “well being index”, composed of 13 factors related to education, safe and involved communities, equity, and environmental quality of life, was used by the State to evaluate California's counties (CDF 2003). Each of the five North Coast counties was ranked as above average in its well being index, although below average in per capita income. The State report concluded that “the primary challenge for most of the forest and rangeland bioregions appears to be diversifying and expanding their economies while maintaining the relatively high scores in other aspects of well being.” A diverse economic structure is one type of strategy to minimize the effects of natural resource production cycles and other external factors affecting the local economy (Christiansen et al. 2000). It may also help insulate the county economy from the effects of state and national recessions.

Unemployment rates have consistently been higher in northwestern California than in the rest of the State (Christiansen et al. 2000). Average annual (non-seasonally adjusted) unemployment rates for the region vary from year to year, as noted in Table 4-22 (Calif. EDD 2005). The state and national economies were robust in the year 2000 and lower unemployment rates reflected this condition, while economic conditions deteriorated in 2001 and are still recovering.

The unemployment rate for Siskiyou County has ranged from a high of 15% to a low of 8% between 1985 and 2001. During this same period, California's unemployment rate fluctuated in a somewhat parallel pattern from 10% to 5% (CED 2002). Siskiyou and Trinity counties have chronically higher unemployment rates than the other counties in the region, perhaps reflecting their less diverse economies and lower costs of living.

Table 4-22. Average Annual Unemployment Rates for Selected Years (%)

	<b>1995</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>
Del Norte	12.3	7.5	9.3	8.3
Humboldt	8.3	5.8	6.5	6.5
Mendocino	9.5	5.5	7.2	6.5
Siskiyou	14.3	7.4	9.9	9.4
Trinity	14.6	9.7	11.0	10.8
<b>California</b>	7.9	5.0	6.7	6.2

Source: Calif. EDD 2005

Also, the unemployed tend to move away from areas with no jobs. This effect was evident in the county population figures for this time period following 1995 (when timber harvest on public lands was dramatically reduced), with Siskiyou and Trinity counties showing negative to negligible growth rates (see Table 4-16).

#### 4.12.2 Fishing (Commercial and Recreational)

California's North Coast supports two commercial fishing areas, Eureka and Fort Bragg, represented by several ports each. The Eureka region includes the ports of Crescent City, Eureka, Trinidad, Shelter Cove, Field's Landing, and a few smaller ports. Fort Bragg's area represents the ports of Fort Bragg, Point Arena, Albion, Elk, Westport, and Little River (CDFG 2003).

Chinook salmon landings in California for 2002 totaled 4,821,170 pounds for a value of \$7,385,906 (CDFG 2003). Of this amount, the port areas of Eureka contributed 5% and Fort Bragg 23% of the state's value for chinook. California's commercial salmon catch amounted to 26% of the value of chinook salmon landed in the U.S. that year (NMFS 2003). The State's Commercial Salmon Stamp licenses have greatly fluctuated in number over the past decade: a high of 571,755 in 1996 to a low of 158,355 in 2002 (CDFG 2005c).

Commercial landings in the region include many other species of fish and shellfish. In 2002, Eureka area ports landed 23.1 million pounds in its commercial fishery for a value of \$13.2 million, while Fort Bragg area ports landed 10.7 million pounds worth \$8.3 million. Combined, the two North Coast port areas contributed 21% of the State's commercial fish value (CDFG 2003). Crescent City supports a diverse fishing fleet of about 100 vessels, Eureka has 75 vessels (primarily focused on bottomfish and crab), and Fort Bragg has about 20-25 shrimp and groundfish trawlers (NMFS 2003).

Charterboats for ocean sport fishing were once popular in the North Coastal ports, but have reduced in the recent decade, with Fort Bragg having the most charterboats for ocean recreational fishing (NMFS 2003). Recreational stream and lake fishing is popular throughout the region. Humboldt County, followed closely by the other North Coast counties, leads the State in the number of sport salmon punch cards and steelhead report cards issued by the CDFG

(CDFG 2005c). In 2004, 37,558 sport salmon punch cards and 259,520 steelhead report cards were issued statewide. These numbers fluctuate annually, but steelhead report cards reached a record last year. Wild trout waters are designated by CDFG in upper Klamath River and in Stone Lagoon (Humboldt County), where coastal cutthroat trout are stocked for high quality angling.

#### 4.13 Cultural Resources

Cultural resources involve the contributions and experiences of California's human occupation over the past 10,000 to 12,000 years. Such heritage is evidenced by "archaeological remains, historic buildings, traditional customs, tangible artifacts, historical documents, and public records" (Calif. OHP 1997). Preserving and enhancing the State's irreplaceable historic heritage is the mission of the State Historical Resources Commission and the Office of Historic Preservation (OHP).

Project proponents must consider the impact of their project upon historical resources, as required by federal, state, and local laws. The National Historic Preservation Act's Section 106 requires federal agencies to do this for federal projects, including consultation with the State Historic Preservation Officer (SHPO). State and local agencies are required to perform historic impact analysis as part of the California Environmental Quality Act (CEQA) process. In addition, some counties and cities have historic and archaeological ordinances (e.g., Mendocino).

Significantly important historic and archaeological sites are registered through programs for the National Register of Historic Places, the California Register of Historical Resources, the California Historical Landmarks, and the California Points of Historical Interest. In the North Coast, Humboldt County has 13 registered Historical Landmarks, Del Norte, Mendocino and Siskiyou counties each have 7, and Trinity County has 2 ([//ohp.parks.ca.gov](http://ohp.parks.ca.gov)). These sites include sunken ships off the coast, historic military posts, old Indian villages, significant architectural buildings, landmarks, entire towns, Chinese temples, old trails and roads, and abandoned mining sites. Some State Parks in the region are also devoted to protecting and restoring historic buildings and locations, such as Fort Humboldt and Point Cabrillo Light Station.

North Coast tribes have historically fished for salmon and steelhead (as well as lamprey and sturgeon), originating unique cultural practices. Religion, rituals and myths developed with each tribe around the fall chinook salmon spawning season and the capturing of this major food source. On the Klamath River, fishing sites were held and controlled by Indian families for generations, with fish captured by spears, nets, and weirs (McEvoy 1986). In the post-contact era, tribal members have competed with whites for subsistence and commercial fishing rights and values, but their cultural need for salmon has translated into legal rights and federal responsibilities.

#### 4.14 Federal Tribal Trust Responsibilities, Tribal Rights and Interests

Four of the five counties have federally-recognized Native American Indian tribes located within their boundaries (Table 4-23). Mendocino County has the most tribes (10) while Trinity County has none that are federally recognized. Three large reservations can be found within the region:

the Hoopa Valley Indian Reservation (for the Hupa Tribe), the Yurok Reservation, and Round Valley Indian Reservation (for multiple Northern California tribes). Other tribes, or tribal bands, are associated with rancherias or other tribal properties. In addition, there are some small tribes and clans that are not federally recognized.

Table 4-23. California Native American Indian Tribes in the Five County Region, 2004.

<b>Del Norte</b>	<b>Humboldt</b>	<b>Mendocino</b>	<b>Siskiyou</b>	<b>Trinity</b>
Elk Valley Rancheria	Bear River Band of Rohnerville Rancheria	Cahto Indian Tribe of the Laytonville Rancheria	Karuk Tribe of California	
Smith River Rancheria	Big Lagoon Rancheria	Coyote Valley Band of Pomo Indians	Quartz Valley Indian Reservation	
Resighini Rancheria	Blue Lake Rancheria	Guidiville Rancheria		
Tolowa Tribe of Elk Valley	Cher-Ae Heights Indian Community of the Trinidad Rancheria	Hopland Band of Pomo Indians of the Hopland Rancheria		
Yurok Indian Tribe	Hoopa Extension Reservation	Manchester Band of Pomo Indians of the Manchester-Point Arena Rancheria		
	Hoopa Valley Tribe & Reservation	Pinoleville Rancheria of Pomo Indians		
	Table Bluff - Wiyot Tribe	Potter Valley Tribe		
	Yurok Tribe & Reservation	Redwood Valley Rancheria of Pomo Indians		
		Round Valley Indian Tribes & Reservation		
		Sherwood Valley Rancheria		

Source: U.S. Bureau of Indian Affairs 2004

Federal and State policies on Indian fishing rights and federal-tribal trust responsibilities have evolved over the years in California (McEvoy 1986). Unlike most Northwest tribes, the California tribes did not have treaties defining their rights. Court cases have helped define tribal rights in recent decades. For example, the U.S. Supreme Court case of *Matts v. Arnett* (1972) concluded that the lower Klamath River was “Indian country” and that the state did not have the authority to regulate subsistence Indian fishing there. Salmon fishery allocation is now handled by the federal Klamath Fisheries Management Council (under the Pacific Fisheries Management Council), with due recognition of tribal fishing rights. The larger North Coast tribal governments operate fisheries departments to help them manage their fishery.

Various Presidential Executive Orders and Secretarial Orders have also addressed tribal rights and federal responsibilities. Indian tribes are officially recognized as domestic dependent nations which can exercise inherent sovereign powers over their members and territory. Their natural resources are held by the federal government in trust for the tribes, but their lands are not

considered federal public lands. In 2000, Executive Order 13175 was signed by former President Clinton to “establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications”, among other purposes. President Bush has continued this federal policy direction with Executive Order 13336 (2004), “American Indian and Alaska Native Education”. Both orders direct the head of each federal executive department and agency to adhere to the orders’ principles and to fully respect the rights of self-government and self-determination due tribal governments.

For the Endangered Species Act (ESA), Secretarial Order #3206 was adopted in 1997 regarding the federal-tribal trust responsibilities related to the Departments of Commerce and Interior (USFWS 2005). This Order covers NMFS, the U.S. Fish and Wildlife Service, and the Bureau of Indian Affairs, among others. The agencies and tribes recognized that they have a common goal of conserving sensitive species (i.e., candidate, proposed, and listed) and the ecosystems upon which they depend. Government-to-government collaboration and communication are to be used in the administration of the ESA by the federal agencies. Before tribal fishing rights can be restricted, a 5-prong test is applied to incidental take restrictions under the ESA to ensure that other alternatives cannot adequately achieve the necessary conservation purpose.

The California Environmental Protection Agency (Cal/EPA) desires to give special consideration to the State’s Native American Tribes due to their status as sovereign nations. It proposes a Tribal Communication Policy and Guidance in order to consider a tribe’s individual cultural needs in the public participation process by Cal/EPA, such as watershed issues, pollution prevention, toxic cleanups, fish warnings, and enforcement cases and permitting (Cal/EPA 2005).

#### 4.15 Environmental Justice

The ability for all people – regardless of race, color, nation, or origin or income – to enjoy equally high levels of environmental protection is the concept behind the term “environmental justice” (Calif. Resources Agency 2004). In 1999, California legislation first defined Environmental Justice as “the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Government Code Sect. 65040.12 and Public Resources Code Sect. 72000). Similarly, federal law requires federal agencies to identify and address, as appropriate, “disproportionately high and adverse human health or environmental effects of [their] programs, policies, and activities on minority populations and low-income populations” (Executive Order 12898 (59 Fed. Reg. 7629,1994)).

Agency decisions must consider environmental justice when appropriate, such as when adopting regulations, enforcing environmental laws or regulations, making discretionary decisions or taking actions that affect the environment, and interacting with the public on environmental issues. Most state and federal agencies have an Environmental Justice (EJ) Coordinator to ensure compliance with the relevant policies. In California, the Governor’s Office of Planning and Research (OPR) is the coordinating agency in state government for environmental justice programs (Calif. OPR 2003). Cal/EPA has an EJ Action Plan for its various boards, departments,



and offices, with a proposed public participation policy addressing environmental justice (Cal/EPA 2005).

The North Coast region is primarily low-income with small minority populations. (See sections 4.11 and 4.12 for a more detailed description of regional economic and racial data.) Through the systematic implementation of the 5C Road Manual's BMPs, road maintenance practices in the region would likely not be socially discriminatory or exclusionary in providing environmental protection.

## 5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

### 5.1 Introduction

This chapter describes the potential environmental consequences of the two alternatives. The 5C RRM Manual provides specific guidance for the project level. In Table 5-1 is a summary of the potential environmental impacts for each of the elements described in Chapter 4. Descriptions of each element and each alternative follow. Specific BMPs from the Manual, designed as mitigation measures or environmental commitments, are listed for each pertinent category of resource concern in Appendix B.

#### Alternative 1 - No Action

This alternative represents the condition of not implementing the 4(d) rule or its limits for the four threatened salmonid ESUs in northwestern California. As a result, NMFS would continue to require consultation under section 7 of the ESA for all routine county road maintenance projects that use Federal funds (e.g., FEMA or Federal Highway Administration) or apply for a Federal permit (such as a Clean Water Act Section 404 permit from the US Army Corps of Engineers). Alternative 1 is the physical and biological status quo, and presents the environmental and social baseline upon which to measure the effects of taking any action. There would be little incentive for each county to adopt and implement the RRM Manual to its maximum potential if maintenance projects are delayed or made more expensive due to NMFS consultation requirements under section 7 of the ESA.

#### Alternative 2 - Take Prohibitions with Limits (Proposed Action)

The Proposed Action implements the ESA Section 9 take prohibitions with a limit on their application for routine county road maintenance projects that meet the Limit 10 criteria defined in the 4(d) rule. Specifically, Alternative 2 is the submittal of the Five Counties RRM Manual for approval by NMFS under Limit 10 of the 4(d) rule (NMFS 2002). If the agency determines that the Manual meets the criteria stated in Limit 10 for the conservation of listed fish, then the take prohibitions under section 9(a)(1)(B) and 9(a)(1)(C) of the ESA would not apply. As encouraged by the NOAA Strategic Plan, this alternative fosters cooperative management relationships with the five counties as stakeholders (NOAA 1997). This option provides an incentive for the five counties to more immediately adopt and seriously implement the RRM Manual's BMPs due to the resulting permit streamlining under the ESA.

#### California Environmental Quality Act (CEQA) Compliance

The adoption of the 5C RRM Manual by each county is considered categorically exempt under ten sections (or "classes") of the California Environmental Quality Act (CEQA) (Lancaster 2004). For its adoption by Trinity County, the Planning Department (as lead agency under CEQA) prepared an initial study, an environmental checklist, and an evaluation of environmental impact and found that there was a "less than significant" level of potential effect on the environment (Trinity County 2004). As a result, the County concluded that the Manual's adoption could not have a significant effect on the environment and also found it to be

categorically exempt. However, site-specific projects addressed in the Manual that are not categorically exempt may require CEQA analysis. Examples of such projects may include culvert replacement in streams with listed fish and modification of stream channels to protect a county road or facility.

Table 5-1. Summary of Potential Impacts Associated with the Limit 10 Alternatives.

<b>Resource</b>	<b>Alternative 1: <i>No Action</i></b>	<b>Alternative 2: <i>Proposed Action - Take prohibitions with limits</i></b>
LAND USE	Current land use policies would continue to control existing and proposed land uses.	Same as No Action
GEOLOGY & PHYSIOGRAPHY	Existing RRM activities do not cause additional land disturbance beyond existing road-related effects on the landscape.	Potential for road-related landslides may be reduced due to disconnecting the roads from the hydrology through ditch relief culverts, outsloping, and other practices. Spoil disposal site selection BMPs help avoid potential unstable sites.
SOILS	Some erosion control measures would continue, but no comprehensive program to prevent erosion and correct priority problem sites would necessarily be implemented.	Beneficial impact on soils due to emphasis on erosion prevention and vegetation protection. Comprehensive erosion control BMPs and training and systematic implementation of Road Erosion Inventories priority problem sites would reduce soil erosion.
CLIMATE	No change to climate, climate patterns, and processes from current RRM activities.	Same as No Action
AIR QUALITY	RRM practices abide by air quality plans and regulations. Minor dust and particulate matter could be produced by road work, but not significantly at the watershed scale.	Same as No Action, but with potential for reduced dust and particulate matter due to dust abatement BMPs and emphasis on road rocking and paving.
WATER QUANTITY	No change beyond existing conditions. Concentrated runoff from rural roads can increase peak storm flows and alter channels.	BMPs seek to disconnect roads hydrologically through outsloping, increased ditch relief culverts & critical dips, where feasible. Culverts are

<b>Resource</b>	<b>Alternative 1: <i>No Action</i></b>	<b>Alternative 2: <i>Proposed Action - Take prohibitions with limits</i></b>
		encouraged to be sized for 100-year flood events, reducing the potential for flooding of roads. Water drafting BMPs would help protect streamflows for fish.
WATER QUALITY	No adverse impact beyond existing conditions and practices for rural roads. Not all RRM practices are regulated under water quality permits, so proactive action is needed.	Implementation of BMPs and crew training program would increase water quality protections. Sediment sources would be targeted for corrective action and potential spills would be prevented. Major emphasis of Manual is on water quality protections.
FISH & WILDLIFE – ESUs	No additional adverse impact since individual RRM projects would be modified as needed under section 7 modifications. Decline of ESU populations would likely continue.	Proactive road-related BMPs to protect the ESU species would accelerate. Fish Passage Inventories prioritize needs for listed salmonids through culvert replacements. ESUs would benefit from prompt and comprehensive implementation of Manual's BMPs.
FISH (not including the 4 ESUs)	RRM activities would continue without mitigations under section 7 consultation.	BMPs would occur in all streams and for all RRM activities that could affect any fish, listed or not. Habitat and population conditions would likely benefit as improved practices become routine.
THREATENED & ENDANGERED FISH SPECIES	Current population, habitat, and health trends of other listed fish species would likely continue.	Other listed fish species would benefit from the increased implementation of the BMPs and resulting water quality and stream habitat protections. Habitat conditions would potentially improve.
BIRDS, LAND MAMMALS, AND HERPETOFAUNA	No additional adverse impacts beyond current conditions. Vegetation protection for habitat not presently a priority unless species are listed.	No adverse impacts and possible beneficial effects due to BMPs designed to protect existing vegetation (upland and riparian) to prevent erosion.

<b>Resource</b>	<b>Alternative 1: <i>No Action</i></b>	<b>Alternative 2: <i>Proposed Action - Take prohibitions with limits</i></b>
		Potential beneficial effects, such as from bridge maintenance measures to protect nesting bats and swallows.
THREATENED & ENDANGERED WILDLIFE SPECIES	No change in impacts due to existing state and federal regulations protecting listed wildlife species.	No adverse and potential positive effects due to emphasis on habitat protection practices.
VEGETATION	Continued minor vegetation impacts due to lack of emphasis on erosion prevention through vegetation protection (riparian, wetland, and upland).	No adverse and potential beneficial effects through protections of existing vegetation to prevent erosion and to protect sensitive species.
ECONOMY	Existing RRM efforts would have no effect on regional economy.	Similar to No Action. Potential for increased local costs to implement some BMPs. Improved roads could help stimulate local economy.
TOURISM & RECREATION	Routine road maintenance would have no negative effect on tourism or recreation.	Same as No Action
CULTURAL RESOURCES	Routine road maintenance would have no effect on cultural resources because minor or no ground disturbance would occur.	Same as No Action
FEDERAL TRUST RESPONSIBILITIES	Routine road maintenance would have no effect on tribal trust responsibilities.	Same as No Action
ENVIRONMENTAL JUSTICE	Routine road maintenance activities would not affect environmental justice policies.	Same as No Action

## 5.2 Environmental Consequences

### 5.2.1 Land Use - Both Alternatives

The RRM Manual addresses all county road infrastructure and related facilities. It does not apply to agricultural or forest lands or to roads within incorporated cities. The Manual is consistent with policies in the counties' General Plans (including the Land Use Element and Open Space and Conservation Elements) as well as zoning and other related ordinances (e.g., Trinity County

2004). As such, the activities under the two Alternatives would likely have no effect (adverse or beneficial) on land use, land management, or land ownership changes in the region. Maintaining the counties' roads helps to maintain the existing land uses. Land use changes are more affected by the economy and population pressures.

### 5.2.2 Geology and Physiography - Both Alternatives

Neither Alternative would have significant effects on geology or physiography in the analysis area, as described in Section 4.3 – Affected Environment, Geology and Physiography. When implemented, some BMPs within the Manual may help reduce the potential for on- or off-site landslides related to roads. In particular, the practices related to ditch relief culverts (location of drainage, outsliping), spoil disposal and stockpiling (especially site selection), and slide and settlement repair can help prevent or minimize road-related mass wasting. Nothing in the Manual or the Alternatives would additionally expose people to seismic hazards, seismic-related ground failure, or liquefaction.

### 5.2.3 Soils

#### 5.2.3.1 Alternative 1- No Action

No adverse effects under this alternative at the basin or watershed scale would result from Alternative 1 for soils (subsection 4.4, Affected Environment). Under this status quo option, routine road maintenance activities would continue to implement some erosion control measures. However, no comprehensive BMP program to prevent or correct soil erosion problems associated with county roads would necessarily be implemented. As a result, erosion problems could continue or be created at the stream reach scale. Examples of road-related erosion and sediment issues at the reach scale include: runoff from spoil disposal sites, deposition of road fill due to blocked culvert and road wash-out, and sidecasting dirt into a stream from road grading work. Sedimentation resulting from inadequate erosion control would continue to impair stream segments that are listed as sediment-impaired in the North Coast region. However, at the watershed scale, continuing the status quo efforts would likely not have a significant adverse impact.

#### 5.2.3.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

This alternative would have no adverse effect on soils at the watershed or reach scale, but would likely have a beneficial effect on soil protection and water quality. BMPs from the RRM Manual are specifically designed to prevent or minimize erosion and sediment delivery to streams from county roads and related facilities (see Appendix B). Such best management practices include, but are not limited to, the following: sediment control measures at spoil disposal sites, replacement of seriously undersized or rusted culverts, and avoidance of sidecasting dirt into streamcourses. The comprehensive nature of the erosion and sediment-related BMPs, including the systematic training of road maintenance crews in erosion control practices described in the Manual, would better protect the soils in the analysis area. Systematic implementation of the Road Erosion Inventories for County Roads would focus on correcting priority erosion sites (existing and potential), as a byproduct of the RRM Manual and 5 C Program.

#### 5.2.4 Climate - Both Alternatives

Neither Alternative would provide adverse or beneficial effects on climate in the analysis area (subsection 4.5, Affected Environment). The Manual does not call for actions that would alter climate.

#### 5.2.5 Air Quality - Both Alternatives

No adverse or beneficial effects on air quality would result from Alternative 1 or 2. The RRM Manual is designed to prevent or minimize adverse effects to air quality from road-related activities. It complies with existing air quality plans and regulations (see 4.6, Affected Environment – Air Quality). Recommended actions would not create objectionable odors nor release air pollutants. Specific BMPs are designed to prevent and minimize the release of potential air pollutants, such as those prescribing road surfacing and dust abatement practices. Additionally, the counties are seeking to surface unpaved roads, as funding is available.

#### 5.2.6 Water Quantity

##### 5.2.6.1 Alternative 1 - No Action

The No Action alternative would not adversely affect water quantity beyond existing conditions. With the original design of many rural roads, runoff is concentrated into ditches which can increase peak storm flows and deliver water into areas that would not naturally receive such flows (see 4.7, Affected Environment – Water Quantity). RRM practices have tended to continue this effect of the design. Under Alternative 1, existing maintenance practices would continue and the hydrologic effects attributable to roads would remain the same and not increase. Without the regulatory relief of Limit 10, the region's counties would not have as much incentive to proactively pursue changes in county road maintenance practices to minimize hydrologic effects of existing roads.

##### 5.2.6.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

Under Alternative 2, no adverse effects and possible beneficial effects would result. The RRM Manual's BMPs are designed to help county roads disperse runoff in a more natural manner (e.g., installation of critical dips, road outsloping, more frequent ditch relief culverts) to restore more natural drainage patterns, where feasible. Flooding would not be increased by the Manual's activities but could be decreased at some sites. Culverts are encouraged to be replaced and sized to accommodate 100-year flood flows, significantly better than most existing county road culverts. New structures or material storage would not occur within the floodplain, which could impede or restrict flows. Where feasible, roads are encouraged to be outsloped or to have sufficient ditch relief culverts in order to prevent or minimize the interruption of normal runoff into streams (see Appendix B). Outsloping and installation of rolling or critical dips are designed to Low Impact to Hydrology (LITH) Design Guidelines that comply with the American Association of State Highway and Transportation standards for safety (Mendocino County DOT 2004).

None of the Manual's activities would directly affect water supplies. Groundwater supplies and groundwater recharge would not be affected. However, water drafting for dust control on roads can potentially change the amount of surface water in a water body. More water drafting is not called for in the Manual, but instead drafting procedures are designed to have minimal or no effects to the water body, water supplies, and wildlife. These procedures follow the guidelines prepared by CDFG and NMFS. The Proposed Action would provide an incentive to counties in the region to additionally minimize the existing adverse effects of the county road network on the hydrology.

### 5.2.7 Water Quality

#### 5.2.7.1 Alternative 1 - No Action

Alternative 1 would not adversely impact water quality beyond the existing conditions resulting from current RRM practices (see 4.8.2, Affected Environment – Roadways and Water Quality). Some water quality protection measures are in place, but not to the extent promoted by the RRM Manual's BMPs. County Road Erosion Inventories are complete for most of the roads within the region, but implementation is dependent upon funding and regulatory incentives for certain measures (e.g., creating critical dips at stream crossings). Besides erosion control practices, other road-related water quality issues would not be directly addressed under the No Action alternative as under Alternative 2 (see Appendix B).

#### 5.2.7.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

Alternative 2 is anticipated to result in enhanced water quality. Since roads are identified in the North Coast region as among the top sources of sediment delivery to streams, stream quality should improve with the reduction in county road-related sediment sources. The RRM Manual's BMPs include, but are not limited to, erosion control measures for disturbed sites, proper storage of spoil stockpiles, and the outsloping of certain road segments. Other pollution sources would be prevented or minimized through appropriate BMPs, such as practices at maintenance yards for hazardous wastes, at bridges during repainting, for chemical anti-icing and de-icing, and fuel and oil containment (see Appendix B).

### 5.2.8 Fish and Wildlife

#### 5.2.8.1 Salmonid ESUs

The four salmonid ESUs that are within the scope of this Environmental Assessment were listed as threatened due to the declines of the species' populations. The No Action Alternative continues the current requirement for NMFS consultation under section 7 for county RRM projects subject to federal permitting. Under the Proposed Action of offering the ESA conservation tool of Limit 10 of the 4(d) rule, the activities potentially leading to habitat degradation may be affected. The analysis below focuses on the probable effects of the two alternatives as viewed in isolation from the other factors that affect these four ESUs (see 4.9.1 and 4.9.1.3, Affected Environment).



#### 5.2.8.1.1 Alternative 1 - No Action

This Alternative would have no additional adverse impact on the status of the threatened salmonid species in the four ESUs since individual RRM projects would be modified as needed under section 7 ESA consultation with NMFS. Proactive, voluntary road maintenance efforts not required by consultation might not be implemented, however. Other beneficial actions outside of ESA requirements would also likely occur.

#### 5.2.8.1.1 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

The RRM Manual is designed to protect anadromous salmonid species and their habitat through its many BMPs. Fish passage efforts, for example, would be accelerated and implemented, along with habitat protection (e.g., sediment controls, riparian protections) and population protection (e.g., fish screens for water drafting, fish exclusion practices for instream work). Priority attention for culvert replacements is based on the critical status and needs of the listed salmonid species in the region, as identified in each County Road Fish Passage Inventory. The Proposed Action would benefit the ESUs by encouraging the prompt and comprehensive implementation of the Manual.

#### 5.2.8.2 Fish (not including the 4 Salmonid ESUs)

##### 5.2.8.2.1 Alternative 1 - No Action

RRM activities that do not potentially affect listed ESU species would not require a section 7 consultation. As a result, additional mitigations by NMFS would not be put in place that could also benefit other fish species. This No Action Alternative would not have any effect on non-listed ESU fish.

##### 5.2.8.2.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

Habitat conditions and population protections would likely improve as a result of the Proposed Action, due to implementation of the RRM Manual's BMPs on a routine basis. Other aquatic species would likely benefit also due to improved staff training and monitoring of BMP implementation and effectiveness. Invasive, non-native fish species are a problem in the ESUs, but are not directly affected by the Proposed Action.

#### 5.2.8.3 Threatened and Endangered Fish Species

The three listed species in the ESUs – coho salmon, chinook salmon, and steelhead -- are the only salmonid fish listed in the region. However, several warm water and cold water fish species in the North Coast are also listed as endangered or as special concern species by federal and state agencies (see subsection 4.9.1.3, Affected Environment). Habitat requirements tend to be different for these other species, but good water quality and adequate stream flow are essential for each one.

#### 5.2.8.3.1 Alternative 1 - No Action

Current population, habitat, and health trends of these other fish species would likely continue under the No Action alternative, although other fish conservation efforts are also seeking to recover these listed species. Existing RRM practices would continue, except where an activity might affect the listed species and section 7 consultation would be needed with US Fish and Wildlife Service or NMFS.

#### 5.2.8.3.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

The Manual's BMPs are specifically intended to protect listed and special concern fish species and their habitat in the region. While the emphasis is on the salmonid ESU species, the other listed fish species would benefit from the increased implementation of the BMPs and the resulting water quality and stream habitat protections. As a result, Alternative 2 would likely have an improved effect on other listed fish species where habitat conditions are limiting.

#### 5.2.8.4 Birds, Land Mammals, and Herpetofauna

Wildlife potentially affected by RRM activities are amphibians and turtles (herpetofauna), roadside foragers (birds and small mammals), bridge dwellers (bats and swallows), and riparian inhabitants (mostly birds). Upland road-related activities potentially affecting wildlife include riparian removal, spoil disposal, ditch cleaning, channel maintenance, bridge painting and repair, and vegetation management. (See subsection 4.9, Affected Environment.)

##### 5.2.8.4.1 Alternative 1 - No Action

The alternative of no take prohibitions in effect would not create additional adverse impacts, assuming RRM would continue existing practices with a minimum level of habitat protection and erosion control. Vegetation protection for wildlife habitat is not presently a priority unless the species are listed.

##### 5.2.8.4.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

The Proposed Action would not cause adverse impacts and may create some beneficial effects on birds, mammals, and herpetofauna. The focus of the RRM Manual is on protection of freshwater aquatic species rather than upland species. However, the protection of all existing vegetation (upland and riparian) to prevent erosion is one of the primary principles addressed throughout the Manual. This practice would protect habitat for birds, mammals, and herpetofauna. Bridge painting and repair BMPs specifically address the avoidance or minimization of possible impacts to nesting bats and swallows under the bridge structure.

#### 5.2.8.5 Threatened and Endangered Wildlife Species

##### 5.2.8.5.1 Alternative 1 - No Action

The No Action Alternative would not create additional impacts to listed wildlife species, as NMFS does not have section 7 ESA consultation authority over these non-salmonid species. Listed wildlife species are protected under federal and state laws that are still applicable to RRM projects that may affect them (subsection 4.9.2.1 & .2, Affected Environment).

#### 5.2.8.5.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

Alternative 2's take limit for the four ESUs and their listed salmonid species would not affect threatened and endangered wildlife species. The Manual's BMPs are intended to protect listed and special concern wildlife species and their habitat. Pertinent habitat protection practices include careful selection of spoil disposal sites (e.g., avoiding wetlands and vegetation removal), and bridge maintenance measures to protect nesting birds and bats.

### 5.2.9 Vegetation

#### 5.2.9.1 Alternative 1 - No Action

Maintaining status quo consultation for RRM projects would not negatively impact vegetation, including listed plant species (subsection 4.10, Affected Environment – Vegetation; 4.10.1 Threatened and Endangered Plant Species). Existing routine road maintenance practices, without implementation of the Manual's BMPs, do not emphasize vegetation protection unless listed plants are identified on-site. Erosion prevention through vegetation protection (upland and riparian) is not a significant priority under the status quo condition.

#### 5.2.9.2 Alternative 2 - Take Prohibitions with Limits (Proposed Action)

The Proposed Action would not cause adverse impacts and may create beneficial effects on vegetation. Through encouragement of the Manual's BMPs, this Alternative would improve implementation of pertinent practices. The Manual is designed to protect riparian and other sensitive plant communities as well as jurisdictional wetlands. Riparian protection BMPs are listed throughout the Manual, such as under channel maintenance, road surfacing, vegetation management, culvert cleaning, temporary stream diversions, spoil disposal and stockpile maintenance, bridge maintenance, emergency maintenance, and snow and ice removal (see Appendix B). Prevention of erosion through vegetation protection is a principle emphasized throughout the Manual.

#### 5.2.10 Demographic Trends - Both Alternatives

Neither Alternative would affect demographic trends. Implementation of the Manual's practices would not induce population growth directly or indirectly nor would it displace housing or people. Some rural areas have declining populations while other areas in the region are rapidly growing (subsection 4.11, Affected Environment). These same trends would not be affected by Alternative 1 or 2.

### 5.2.11 Economy - Both Alternatives

The regional and local economies would not be affected by the proposed actions under either Alternative. The Proposed Action (Alt. 2) may have a slight effect on additional costs by the five counties for RRM activities, though major projects (e.g., large culvert replacements and road paving) are dependent upon available funding. On the other hand, maintaining the existing county roads to better meet water quality and stream habitat protections can help the counties avoid expensive fines and reduce chronic problem sites (e.g., undersized culverts). The Proposed Action could benefit the counties economically by minimizing possible liability under the ESA and reducing the time to get federal permits for important RRM projects.

### 5.2.12 Tourism and Recreation - Both Alternatives

Neither Alternative has a direct beneficial or adverse affect on tourism and recreation. As a result of the Manual, the use of existing neighborhood, regional, state, and national parks would not be increased. Additional recreational facilities would also not be required.

### 5.2.13 Cultural Resources - Both Alternatives

Nothing in the two alternatives, nor the RRM Manual, would cause the counties to create adverse effects to historical, archaeological, paleontological, or cultural resources. Existing state laws and regulations prevent the counties from causing disturbance or harm to cultural resources (subsection 4.13, Affected Environment – Cultural Resources).

### 5.2.14 Federal Tribal Trust Responsibilities, Tribal Rights and Interests - Both Alternatives

Actions proposed under Alternatives 1 and 2 would have no effect on Federal Tribal Trust Responsibilities, or Tribal Rights and Interests (subsection 4.14, Affected Environment).

### 5.2.15 Environmental Justice - Both Alternatives

Alternatives 1 and 2 would have no adverse or beneficial affect on Environmental Justice described in subsection 4.15, Affected Environment.

## 6.0 CONSULTATION AND COORDINATION

### Notification of Preparation: Notification List

An e-mail letter announcing the preparation of this Environmental Assessment was sent to the following list of federal, tribal, state, and local agencies and organizations in April 2004. No comments were received.

#### Local Government

Del Norte County Board of Supervisors – C. Blackburn  
Del Norte County Community Development Department - Ernest Perry, Art Reeve  
Five Counties Salmonid Conservation Program – Mark Lancaster, Sandra Perez  
Humboldt County Board of Supervisors - Jimmy Smith, Jill Geist  
Humboldt County Department of Public Works – Allen Campbell, Tom Mattson, Don Tuttle  
Humboldt County Planning Department – Kirk Girard, Michael Wheeler  
Mendocino County Board of Supervisors - Michael Delbar  
Mendocino County Department of Transportation - Eugene Calvert, Howard Dashiell  
Mendocino County Planning Department - Raymond Hall  
Mendocino County Water Agency - Dennis Slota  
Siskiyou County Board of Supervisors – Bill Hoy, Joan Smith  
Siskiyou County Department of Public Works - Brian McDermott, Scott Sumner  
Siskiyou County Planning Dept. – Rick Barnum, Jim DePree  
Trinity County Board of Supervisors - Howard Freeman  
Trinity County Department of Transportation - Carl Bonomini, Bill Taggart, Jan Smith  
Trinity County Planning Dept. – John Jelichich

#### State Agencies

CDFG - Larry Week, Don Koch, Gail Newton, Scott Downie, Gary Stacey, Bob Coey, Gayle Garman, Mark Wheatley, Craig Martz, Serge Glushkoff  
California Department of Forestry & Fire Protection – Chris Keithley  
Caltrans – Deborah McKee, Chris Collison, Tim Ash, Jonathan Oldham  
Coastal Commission – Bob Merrill  
North Coast Regional Water Quality Control Board – Andy Baker, John Corbett, Bob Klamt, Bryan McFadin  
Resources Agency – Cathy Bleier  
State Water Resources Control Board – Gaylon Lee  
University of California Cooperative Extension – David Lewis

#### Federal Agencies

Federal Highway Administration - Larry Vinzant, Stephanie Popiel  
NMFS, Arcata - Irma Lagomarsino  
NMFS, Santa Rosa - Charlotte Ambrose  
Redwood National Park – Chris Heppe  
US Army Corps of Engineers – Jane Hicks, David Ammerman, Kelley Reid  
US Environmental Protection Agency – Sam Ziegler  
US Fish and Wildlife Service – Wayne White, Phil Detrich  
US Forest Service – Regional Office - Brian Staab  
Klamath National Forest – Supervisor Peg Boland, Roberta Van de Water  
Mendocino National Forest – Phoebe Brown  
Shasta-Trinity National Forest – Supervisor Sharon Hayward

Six Rivers National Forest – P. Lawrence

Tribal

Karuk Tribe – Dan Gale

Hoopa Tribe – Mike Orcutt

Yurok Tribe – Troy Fletcher

Round Valley Indian Reservation – Deborah Oliver (via Fax)

Regional

FishNet 4 C – Kallie Kull

Sonoma County Water Agency - Randy Poole

Other Interested Parties

California Forestry Association – Mark Rentz

California Trout – Tom Wesoloh, Curtis Knight

Friends of the River – Betsy Reifsnider

Northcoast Environmental Center – Tim McKay

Mendocino Resource Conservation District – Tom Schott

Redwood Community Action Agency - Sungnome Madrone

Siskiyou Resource Conservation District

Trinity County Resource Conservation District

Trout Unlimited – Craig Bell

## 7.0 BIBLIOGRAPHY

- Agrawal, A., et al. 2005. A GIS-based Synthesis of Information on Spawning Distributions of Chinook Salmon in the California Coast Chinook Salmon ESU. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-377, Southwest Fisheries Science Center. Santa Cruz CA. 15 p.
- Brown, L.R. and P.B. Moyle. 1997. Invading species in the Eel River, California: successes, failures, and relationships with resident species. *Env. Biol. Fish.* 49:271-291.
- California Air Resources Board (ARB). 2001. Asbestos Airborne Toxic Control Measure for Surfacing Applications. Final Regulation Order. Calif. Code of Regulations Title 17, Section 93106. Sacramento. [www.arb.ca.gov](http://www.arb.ca.gov)
- , 2004. California Air Basins. Sacramento. [www.arb.ca.gov](http://www.arb.ca.gov)
- California Board of Equalization. 2004. California timber harvest statistics: by county. Timber Tax Division. Sacramento. [www.boe.ca.gov/proptaxes](http://www.boe.ca.gov/proptaxes)
- California Coastal Conservancy. 2003. Assessment of Barriers to Fish Passage in California's Coastal Watersheds. Oakland, CA. [www.scc.ca.gov](http://www.scc.ca.gov)
- California Department of Finance (CDOF). County economic data. [www.dof.ca.gov](http://www.dof.ca.gov)
- California Department of Fish and Game (CDFG). 2001. The Status of Rare, Threatened, and Endangered Animals and Plants of California, 2000. Habitat Conservation Div., Sacramento. [www.dfg.ca.gov/hcpb/species](http://www.dfg.ca.gov/hcpb/species)
- , 2003. Final California Commercial Landings for 2002. Marine Resources Div., Sacramento. [www.dfg.ca.gov/mrd/landings02](http://www.dfg.ca.gov/mrd/landings02)
- , 2004. Recovery Strategy for California Coho Salmon: Report to the California Fish and Game Commission. Species Recovery Plan Report. Sacramento.
- , 2005a. State and Federally Listed Endangered and Threatened Animals of California. Habitat Conservation Div., Sacramento. [www.dfg.ca.gov/hcpb/species](http://www.dfg.ca.gov/hcpb/species)
- , 2005b. State and Federally Listed Endangered, Threatened, and Rare Plants of California. Habitat Conservation Div., Sacramento. [www.dfg.ca.gov/hcpb/species](http://www.dfg.ca.gov/hcpb/species)
- , 2005c. Sport Fishing License Statistics. Sacramento. <http://www.dfg.ca.gov/licensing/pdf/files/countyStats/103.pdf>
- California Department of Forestry and Fire Protection (CDF). 2003. The Changing California: Forest and Range 2003 Assessment. Fire and Resource Assessment Program (FRAP). Sacramento. [www.frap.cdf.ca.gov/assessment2003](http://www.frap.cdf.ca.gov/assessment2003)

- . 2004. Watershed mapping. Fire and Resource Assessment Program (FRAP). Sacramento. [www.frap.cdf.ca.gov](http://www.frap.cdf.ca.gov)
- California Department of Transportation. 2003. Statewide Storm Water Management Plan. CTSW-RT-02-008. Sacramento. [www.dot.ca.gov/hq/env/stormwater](http://www.dot.ca.gov/hq/env/stormwater)
- California Department of Water Resources. (CDWR) 1998. California Water Plan Update. Bulletin 160-98, Vol. II. Sacramento.
- . 2005. California Water Plan Update 2005. Public Review Draft. [www.waterplan.water.ca.gov](http://www.waterplan.water.ca.gov)
- California Employment Development Department (EDD). 2004. Unemployment Rates. Labor Market Information Div., Sacramento. [www.calmis.ca.gov](http://www.calmis.ca.gov)
- California Environmental Protection Agency (Cal/EPA). 2005. Environmental Justice (EJ) Action Plan: Proposed Recommendations for Public Participation Policy. Feb. 4, 2005. Sacramento. 5 p.
- California Geological Survey (CGS). 2002. California Geomorphic Provinces. Note 36. Sacramento. [www.conservation.ca.gov/cgs](http://www.conservation.ca.gov/cgs)
- California Governor's Office of Planning and Research (OPR). 2003. Environmental Justice in California State Government. Sacramento. 81 p.
- California Office of Environmental Health Hazard Assessment (OEHHA). 2005. Draft Advisory on Mercury in Fish in Trinity Lake and Other Water Bodies in the Trinity River Watershed. [www.oehha.ca.gov](http://www.oehha.ca.gov)
- California Office of Historic Preservation (OHP). 1997. Forging a Future with a Past: A Comprehensive Statewide Historic Preservation Plan for California. Dept. of Parks and Recreation. Sacramento. <http://ohp.parks.ca.gov>
- California Resources Agency. 2004. Environmental Justice Policy. [http://resources.ca.gov/environmental\\_justice](http://resources.ca.gov/environmental_justice)
- Center for Economic Development (CED). 2002. Siskiyou County 2002 – Economic and Demographic Profile. CSU Chico, Chico CA. 118 p.
- Christiansen, H., McGinnis, W., Raettig, T., and E. Donoghue. 2000. Atlas of human adaptation to environmental change, challenge, and opportunity: northern California, western Oregon, and western Washington. Gen. Tech. Rep. PNW-GTR-478. US Forest Service, PNW Research Station. Portland, OR. 66 p.



- City of Portland, Office of Transportation. 2003. Application to NMFS for a Limit 10(i) (Routine Road Maintenance) Under the 4(d) Rule for Threatened Salmon and Steelhead. March 12, 2003. Portland, OR. 46 p.
- Five Counties Salmonid Conservation Program. 2002. A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds. [www.5counties.org](http://www.5counties.org)
- Forman, R.T.T., et al. 2003. Road Ecology: Science and Solutions. Island Press, Washington DC. 481 p.
- Furniss, M., Flanagan, S., and B. McFadin. 2000. Hydrologically-connected Roads. US Forest Service Stream Systems Technology Center, *Stream Notes* (July 2000): 5-7.
- Kreissman, B. 1991. California: An Environmental Atlas & Guide. Bear Klaw Press, Davis CA.
- Lancaster, Mark. 2004. Roads Manual CEQA Memo to Five Counties Salmonid Conservation Program Members. Trinity County Planning Department, Weaverville, CA. 21 p. (including attachments).
- Marchetti, M.P., Light, T., Moyle, P.B., and J.H. Viers. 2004. Fish Invasions in California Watersheds: Testing Hypotheses Using Landscape Patterns. *Ecological Applications* 14(5):1507-1525.
- McEvoy, A.F. 1986. The Fisherman's Problem: Ecology and Law in the California Fisheries, 1850-1980. Cambridge University Press, NY. 368 p.
- Mendocino County Department of Transportation (MDOT). 2004. Low Impact to Hydrology (LITH) Design Guidelines. Prepared for the Five Counties Salmonid Conservation Program. Ukiah, CA .
- Moyle, Peter. 2002. Inland Fishes of California. University of California Press. Berkeley. 502 p.
- National Marine Fisheries Service (NMFS). 2000a. Environmental Assessment: Application of ESA 4(d) Options for Five Evolutionary Significant Units of West Coast Steelhead: Lower Columbia River, Snake River Basin, Central California Coast, South-Central California Coast, and California Central Valley. <http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/fn14d-refs.html>
- . 2000b. 4(d) Rule Implementation Binder for Threatened Salmon and Steelhead on the West Coast. Northwest and Southwest Regions.
- . 2002. ESA Section 4(d) Limit 10 Programmatic Draft Environmental Assessment. Northwest and Southwest Regions. Portland, OR.

- . 2003a. Fisheries of the United States, 2002. Fisheries Statistics and Economics Div., Silver Spring, MD.
- . 2003b. Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin. NMFS Northwest Region and Alaska Dept. of Fish and Game. pp. 3-55 to 3-56.
- . 2003c. Updated status of Federally listed ESUs of West Coast salmon and steelhead. West Coast Salmon Biological Review Team. NOAA Fisheries Northwest and Southwest Fisheries Science Centers. July 31, 2003. Available on the Internet at:  
[http://www.nwr.noaa.gov/lsrcd/Prop\\_Determins/BRT\\_Report](http://www.nwr.noaa.gov/lsrcd/Prop_Determins/BRT_Report)
- . 2004. Draft Environmental Assessment of Proposed Amendment to 4(d) Protective Regulations for Threatened Salmonid ESUs. Draft NEPA document, November 2004. Northwest Region, Portland, OR. [www.nwr.noaa.gov/salmon/salmesa/Draft\\_4d\\_EA.pdf](http://www.nwr.noaa.gov/salmon/salmesa/Draft_4d_EA.pdf)
- . 2005. Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. 37160 Federal Register Vol. 70, No. 123 (June 28, 2005).
- National Oceanographic and Atmospheric Administration (NOAA). 1997. NOAA Fisheries Strategic Plan. Silver Spring, MD. [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)
- Norris, R.M. and R.W. Webb. 1990. *Geology of California*. 2<sup>nd</sup> ed. John Wiley & Sons, NY. 541 p.
- North Coast Regional Water Quality Control Board (NCRWQCB). 2001. Water Quality Control Plan for the North Coast Region. Adopted 1993, Amended 2001. Santa Rosa CA.
- \_\_\_\_\_. 2004. Total Maximum Daily Loads – TMDLs. [www.waterboard.ca.gov/northcoast](http://www.waterboard.ca.gov/northcoast)
- North Coast Unified Air Quality Management District. 1995. Particulate Matter (PM 10) Attainment Plan. Adopted May 11, 1995. Eureka, CA.
- . 1999. North Coast Air Quality Facts. Eureka CA. 12 p.
- Oregon Department of Transportation (ODOT). 1999. Routine Road Maintenance: Water Quality and Habitat Guide Best Management Practices. Salem, OR. 51 p.
- Read, A.J. and P.R. Wade. 2000. Status of Marine Mammals in the United States. *Conservation Biology* 14(4):929-940.
- Rice, R.M. 1999. Erosion on logging roads in Redwood Creek, Northwestern California. *J. Amer. Water Resources Assoc.* 35(5):1171-1182.

- Taylor, R.N., Love., M., Grey, T.D. and A.L. Knoche. 2002. Siskiyou County Culvert Inventory and Fish Passage Evaluation: Final Report. Ross Taylor and Associates, McKinleyville, CA. [www.5counties.org](http://www.5counties.org)
- Trinity County Planning Department. 2002. Five Counties Road Erosion Inventory. Final Report. Prepared for the CDFG SB 271 Program. 43 p. [www.5counties.org](http://www.5counties.org)
- . 2004. Project Initial Study, Environmental Checklist, and Evaluation of Environmental Impact: “Acceptance and Implementation of ‘A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds’ by Trinity County Board of Supervisors. Weaverville, CA. 13 p.
- U.S. Bureau of Indian Affairs (BIA). 2004. Tribal Leaders Directory. Dept. of Interior, Washington DC. <http://library.doi.gov/internet/native.html>
- U.S. Census Bureau. 2005. Quick Facts. <http://quickfacts.census.gov/qfd/states/06000.html>
- U.S. D.A. National Agricultural Statistics Service. 2004. Census of Agriculture – 2002. California: State and County Data. Vol. 1, Geographic Area Series, Part 5. [www.nass.usda.gov/ca](http://www.nass.usda.gov/ca)
- U.S. D.A. Natural Resources Conservation Service (NRCS). 2004. Protected Plants of the U.S. – Federal and State Protected Plants in California. Plants Profile. <http://plants.usda.gov/>
- U.S. Department of Commerce. 2004. Regional Economic Accounts. Bureau of Economic Analysis. Wash. D.C. [www.bea.gov/bea/regional](http://www.bea.gov/bea/regional)
- U.S. Fish and Wildlife Service (USFWS). 2005. American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act. <http://endangered.fws.gov/tribal/index.html>
- Washington Department of Transportation (WSDOT), and 24 cities and counties. 2002. Application of Routine Road Maintenance Program (RMP) to NMFS for a 4(d) Take Limit.
- Waters, T.F. 1995. Sediment in Streams: Sources, Biological Effects, and Control. American Fisheries Society Monograph 7. AFS, Bethesda, MD. 251 p.
- Weaver, Bill and Danny Hagans. 2004. California Salmonid Stream Habitat Restoration Manual: Part X Upslope Assessment and Restoration Practices, 188p. [http://www.dfg.ca.gov/nafwb/pubs/2004/manual\\_partX.pdf](http://www.dfg.ca.gov/nafwb/pubs/2004/manual_partX.pdf)

## 8.0 DISTRIBUTION LIST

### **5 C Policy – Board members & Planners**

Marcia Armstrong  
Bill Hoy  
Jim DePree  
Howard Freeman  
R. Jaegel  
John Jelichich  
Mike Delbar  
Hal Wagenet  
Ray Hall  
Jill Geist  
Jimmy Smith  
Kirk Girard  
Chuck Blackburn  
Ernie Perry

### **5 C Road Managers**

Art Reeve  
Brian McDermott  
Scott Sumner  
Carl Bonomini  
Bill Taggart  
Mark Lancaster  
Jan Smith  
Sandra Perez  
Tom Mattson  
Chris Whitworth  
Don Tuttle  
Howard Dashiel  
Dennis Slota

### **State & Federal Resource Agencies**

D. Koch - CDFG –Reg.1  
G. Garman - CDFG-Reg.1  
C. Babcock - CDFG-Reg. 1  
S. Glushkoff - CDFG-Reg. 3  
B. Coey - CDFG-Reg.3  
CDFG –Sacto  
A. Baker - NCRWQCB  
Cathy \_ - Resources Agency  
Chris Keithley - CDF

B. Merrill – California Coastal Comm.  
D.J. Lewis – UC Davis - UCCE  
G. Lee - SWRCB  
Sam Ziegler - USEPA  
Phillip Detrich - USFWS  
J. Hicks – US Army Corps of Engineers  
Kelley Reid – US Army Corps of Engineers  
David Ammerman – US Army Corps of Engineers

### **State & Federal Road Managers**

Deborah McKee - Caltrans  
Chris Collison - CalTrans,  
Tim Ash - CalTrans  
Jonathan Oldham - CalTrans  
Chris Heppe - Redwood National Park  
B. Staab - USFS-Reg.5  
P. Boland - USFS  
P. Y. Brown - USFS  
M. Odle - USFS  
P. Lawrence - USFS  
J. Ranieri - USFS  
Larry Vinzant - FHWA  
Stephanie Popiel - FHWA,

### **Tribal**

K. Arukdnr and D. Gale - Karuk Tribe  
Hoopa Tribe  
Yurok Tribe  
Quartz Valley Indian Res.  
Round Valley Indian Tribe

### **Other Interested Parties**

CalTrout  
North Coast Env. Center

## APPENDIX A

**ANNUAL REPORTING FORM FOR NMFS  
for Section 4(d) of the Endangered Species Act Limitation for Threatened Salmon & Steelhead**

**COUNTY ROAD MAINTENANCE ACTIVITIES  
ADJACENT TO OR WITHIN STREAMS  
implemented according to  
“A Water Quality and Stream Habitat Protection Manual  
for County Road Maintenance in Northwestern California Watersheds”**

Post-Project Tracking Analysis for Year \_\_\_\_\_

<u>County:</u>	<u>Road District:</u>	<u>Date Prepared: Month/Day/Year</u>
<u>Maintenance Activity:</u>	<u>(from Manual’s Chapter Headings)</u>	<u>Project Contact:</u>
<u>Implementation Dates (years):</u>		
<u>Name of Watershed(s):</u>	<u>Sub-Basin:</u>	<u>Basin:</u>
<b>Periods of Operation during the year:</b>		
<b>Duration of Project Activities</b>		

**Table 1. County Road Names, Mile Locations & BMPs:**

<b>Road Name</b>	<b>Road Mile</b>	<b>BMPs</b>

**Table 2. Information for Activities Adjacent to Stream or Instream**

<b>Stream name</b>	<b>Type of work (from Manual's Sub-headings)</b>	<b>Road Name(s)</b>	<b>Number of stream crossings, or sites adjacent to streams, treated</b>	<b>Amount of stream habitat (ft) dewatered, or treated adjacent to stream</b>		<b>Duration (days) of dewatering, or treatment adjacent to stream</b>	
				<b>Dewatered</b>	<b>Adjacent</b>	<b>Dewatering</b>	<b>Adjacent</b>

**Table 3. BMP Implementation and Effectiveness Information**

Best Management Practice (BMP) implementation according to Manual?	Yes		No		If not, why not? Comments
Map attached?	Yes		No		
Photos from photopoint monitoring attached?	Yes		No		
Diagrams of BMPs attached?	Yes		No		

**Additional comments or observations:**

Were salmon and steelhead observed during activities?

Were water quality changes noted?

What changes in BMPs might be needed?

Other?



**Table 4. Change in Baseline conditions of streams and watersheds with Pacific salmonids:**

Salmonid habitat opened up for access (# miles)	
Sediment prevented from yielding to stream (# cubic yards)	
Riparian vegetation planted (# plants)	
Eroded sites stabilized (# acres)	
Roads disconnected from stream (# miles)	
Other	

By signature, I certify that the above annual road maintenance activities met the BMPs listed in the County Road Maintenance Manual as documented in this Form (unless otherwise noted), and protected anadromous fish species and their habitat listed under the Endangered Species Act.

---

 County Engineer

---

 Date

## APPENDIX B

**Mitigation Measures and Environmental Commitments from *A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds* (Five Counties Salmonid Conservation Program, 2002)**

<b>Resource of Concern</b>	<b>Manual's Pertinent BMP Mitigation Measures / Environmental Commitment (BMP # - refer to Content List below)</b>
LAND USE	County Road & Yard Infrastructure: all BMPs
GEOLOGY & PHYSIOGRAPHY	Mass Wasting Prevention: 4-E-2, 5-A-1 (all), 5-B-1-1, 8-B (all),
SOILS	Erosion Control: 3-A-1-6, 3-A-1-7, 3-A-1-9, 3-A-1-10, 3-A-2 (all), 3-A-3 (all), 3-B-1-3, 3-B-4 (all), 3-D-1-5, 4-A-5, 4-E (all), 4-F-8, 5-A-2 (all), 5-A-3 (all), 7-B-1 (all), 8-A (all), 8-B (all), Appendix B-4 (all), App. B-7 (all)
CLIMATE	Not Applicable
AIR QUALITY	Dust Abatement: 3-B-2 (all)
WATER QUANTITY	Stream Flow: 3-B-3 (all), 4-F (all), App. B-8 (all), App. D (all) Hydrologic Impacts: 3-A-1-3, 3-A-1-5, 3-A-4-7, 4-A-3, 4-C (all), 4-E (all), 8-A-7, 8-A-8, 9-A-1-3
WATER QUALITY	Sediment Control: 3-A-1-1, 3-A-1-2, 3-A-1-4, 3-A-2-5, 3-A-2-8, 3-A-2-10, 3-B-1-6, 3-B-1-10, 3-B-3-5, 3-D-1 (all), 4-A (all), 4-E (all), 4-F, 5-B-1, 7-B (all), 9-B-1 (all), App. B-9 (all) Spill & Contaminant Prevention: 3-B-1-1, 3-B-1-3, 3-B-1-8, 3-B-1-8, 3-B-1-13, 3-B-1-14, 3-B-2 (all), 4-F-7, 6-A (all), 6-B (all), 6-C (all), 6-D (all), 7-A-1 (all), 7-B (all), 8-C (all), 9-A-1-2, 9-B-1 (all), 9-B-2 (all) Stormwater: 6-A (all), 6-B (all), 6-C (all), 6-D (all)
FISH & WILDLIFE – ESUs	Fish Passage: 4-B (all), 4-C (all), 4-D (all), App. B-3 (all), App. B-6 (all), App. C (all) See also: Stream Flow / Erosion Control / Habitat Protection / Riparian Protections / others
FISH (not including the 5 ESUs)	Habitat Protection: 3-A-4-4, 3-B-3 (all) Fish Population Protection: 3-A-4-5, 3-B-3-4, 4-A-2, 4-F (all), App. B-5 (all), App. C (all), App. D (all)
THREATENED & ENDANGERED FISH SPECIES	Background: 1-B (all) See: Fish-related BMPs above
BIRDS, LAND MAMMALS, AND HERPETOFAUNA	Population Protection: 7-A (all), 7-B-1 (all) Habitat Protection: 5-A-1, 5-B-1, 9-A-1-6. see also: Riparian Protections / Vegetation Management
THREATENED & ENDANGERED WILDLIFE SPECIES	Status: 1-B (table 1-4) Habitat Protection: 5-A-1 (all), 7-A (all), 7-B-1 (all)
MARINE MAMMALS	Not Applicable
VEGETATION	Riparian Protections: 3-A-4-3, 3-B-1-8, 3-B-1-10, 3-B-1-11, 3-B-1-12, 3-B-2-6, 3-B-4-5, 3-C-1-1, 3-C-1-3, 3-C-2-1, 3-C-2-2, 4-A-1, 4-B-8, 4-F-12, 5-A-1-2, 5-A-2 (all), 5-B-1-1,

<b>Resource of Concern</b>	<b>Manual's Pertinent BMP Mitigation Measures / Environmental Commitment (BMP # - refer to Content List below)</b>
	7-A (all), 7-B (all), 8-A-2, 8-B-7, 9-A-1-6, App. B-7 (all) Vegetation Management: 3-A-1-8, 3-C (all), 5-A-3 (all), 6-B-2, 7-A-2 (all), App. B-4.5, B-4.8
DEMOGRAPHIC TRENDS	Not applicable
ECONOMY	Not applicable
TOURISM & RECREATION	Not applicable
CULTURAL RESOURCES	Not applicable
FEDERAL TRUST RESPONSIBILITIES	Not applicable
ENVIRONMENTAL JUSTICE	Not applicable

## CONTENT OF THE 5 COUNTY ROAD MAINTENANCE MANUAL (Reference to Chapters & Best Management Practices Sections)

### CHAPTER 1 WORKING IN THE WATERSHED

- 1-A Watershed Basics
- 1-B Stream Habitat Needs
- 1-C Road Treatment Principles

### CHAPTER 2 FOLLOWING THE RULES

- 2-A WHO Sets the Rules
- 2-B WHY the Rules are Made
- 2-C WHAT is Required
- 2-D WHEN Permits Happen
- 2-E WHERE to Find Help

### CHAPTER 3 MAINTAINING THE ROADS

- 3-A Grading Practices
  - 3-A-1 Shoulder Blading and Rebuilding
  - 3-A-2 Erosion Repair and Control
  - 3-A-3 Ditch Shaping and Cleaning
  - 3-A-4 Channel Maintenance
- 3-B Road Surfacing and Dust Abatement
  - 3-B-1 Surface Work
  - 3-B-2 Dust Abatement
  - 3-B-3 Water Drafting
- 3-C Vegetation Management
  - 3-C-1 Mowing and Cutting
  - 3-C-2 Tree Removal
- 3-D Winterizing Road System
  - 3-D-1 Winterizing Roads

## CHAPTER 4 MAINTAINING THE CULVERTS

- 4-A Culvert Cleaning
- 4-B Culvert Improvement and Repair
- 4-C Culvert Sizing
- 4-D Culvert Replacement
- 4-E Ditch Relief Culverts
- 4-F Temporary Stream Diversions

## CHAPTER 5 DISPOSING OF THE SPOIL

- 5-A Spoil Disposal
  - 5-A-1 Site Selection
  - 5-A-2 Disposal Site Maintenance
  - 5-A-3 Disposal Site Closure
- 5-B Stockpiling for Reuse
  - 5-B-1 Stockpile Maintenance

## CHAPTER 6 MANAGING THE MAINTENANCE YARD

- 6-A Facility Housekeeping Practices
- 6-B Building & Grounds Maintenance
- 6-C Vehicle & Equipment Maintenance
  - 6-C-1 Fueling
  - 6-C-2 Maintenance & Repair
  - 6-C-3 Pressure Washing
  - 6-C-4 Oil/Water Separators
- 6-D Material Use & Storage
  - 6-D-1 Waste Minimization, Handling & Disposal
  - 6-D-2 Used Oil Recycling
  - 6-D-3 Storage of Hazardous Materials
  - 6-D-4 Outdoor Storage of Raw Materials
  - 6-D-5 Outdoor Loading / Unloading of Materials
  - 6-D-6 Above Ground Tank Leak & Spill Control
  - 6-D-7 Safer Alternative Products

## CHAPTER 7 MAINTAINING THE BRIDGES

- 7-A Bridge Maintenance
  - 7-A-1 Bridge Cleaning and Maintenance
  - 7-A-2 Bridge Vegetation Management
- 7-B Bridge Repair & Drift Removal
  - 7-B-1 Bridge Repair
  - 7-B-2 Drift Removal

## CHAPTER 8 PERFORMING EMERGENCY WORK

- 8-A Emergency Maintenance – General
- 8-B Slide and Settlement Repair
- 8-C Accident Clean-Up

## CHAPTER 9 DEALING WITH SNOW & ICE

- 9-A Snow and Ice Removal
- 9-A-1 Snow and Ice Removal
- 9-B De-Icing , Anti-Icing, and Sanding
- 9-B-1 Sanding
- 9-B-2 De-Icing & Anti-Icing Chemicals

## CHAPTER 10 MONITORING THE PRACTICES

- 10-A Documentation & Reporting
- 10-B Monitoring
- 10-B-1 Implementation
- 10-B-2 Effectiveness
- 10-B-3 Photopoints
- 10-B-4 Project Monitoring
- 10-C Manual Review & Updating

## CHAPTER 11 TRAINING THE STAFF

- 11-A Training Program
- 11-B Training Resources
- 11-C Annual Award

## CHAPTER 12 INFORMATION SOURCES

- 12-A Acronyms
- 12-B Glossary
- 12-C References
- 12-D Sources of Materials

## APPENDICES

### APPENDIX A GETTING THE PERMITS

- A-1 Permit Flow Charts
- A-2 Directory of Agencies

### APPENDIX B BMP STANDARD DESIGN

- B-1 Table of Contents
- B-2 Useful References
- B-3 Culverts
- B-4 Erosion Control
- B-5 Fish Exclusion
- B-6 Fish Ladders
- B-7 Streambank Protection & Channel Improvement
- B-8 Water and Runoff Diversions
- B-9 Water Quality Protection/Sediment Control

APPENDIX C FISH PASSAGE GUIDELINES

- C-1 NMFS Fish Passage Guidelines
- C-2 DFG Culvert Criteria for Fish Passage

APPENDIX D WATER DRAFTING GUIDELINES

- D-1 NMFS Water Drafting Specifications
- D-2 DFG Guidelines for Temporary Water Drafting